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IMPERIAL BUREAU OF ANIMAL HEALTH

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DISEASES CAUSED BY BACTERIA AND FUNGI

BULL, L. B., MURNANE, D., MUNCH-PETERSEN, E., & MACLEAN, J. D. (1940). **Studies on Bovine Mastitis. I.—Study of an Experimental Herd.**—*Bull. Coun. sci. industr. Res. Aust.* No. 134. pp. 107.

The Council for Scientific and Industrial Research have undertaken a long-range programme of investigation into bovine mastitis. The investigation began with a study of an isolated herd originally made up of non-pregnant or recently pregnant heifers and this bulletin reports the observations made during the first two lactation periods of 30 of these animals.

During each cow's first week in lactation, bacteriological examinations were made daily. In the first lactation, 73% of the 119 functioning quarters were sterile during the first week. The remaining quarters showed appreciably high bacterial counts of non-haemolytic micrococci which tended to disappear before the end of the week. *Streptococcus agalactiae* was recovered from 16 quarters during the first week but in no case persisted. In the second lactation, 48% of the 118 functioning quarters were sterile during the first week. In the other quarters, infection persisted for various periods, being present for the first seven days in 46 quarters. *Str. agalactiae* was recovered from five quarters during the first week. During the first lactation, there was no tendency for the bacterial status of the quarter in the first week to be reflected in its subsequent bacterial status, but during the second lactation, 72% of those quarters sterile in the first week remained so, and 95% of those with appreciable counts in the first week showed relatively high counts for the rest of the lactation period.

Bacteriological examinations of milk from each quarter were made at fortnightly intervals after the first week. During the first lactation, 50% of the 119 quarters remained sterile. The others gave appreciably high counts for various periods, eight of them throughout the whole period. Persistent high counts were usually due to non-haemolytic micrococci, but haemolytic staphylococci contributed to the high count in 17 quarters and *Str. agalactiae* in nine quarters. During the second lactation, 34% of the 118 quarters remained sterile. The remainder gave appreciably high counts for various periods, 50 of them throughout the whole period. In each lactation, infections by both micrococci and staphylococci tended to become permanent, but those due to *Str. agalactiae* were transient.

Str. agalactiae was recovered during the first lactation from the milk of 43% of the cows or 25% of the quarters; it produced clinical mastitis in two quarters. In the second lactation, *Str. agalactiae* was recovered from the milk of 70% of the cows or 36% of the quarters and produced clinical mastitis in one quarter. The strains of *Str. agalactiae* recovered from the herd have been classified by agglutination methods mostly into two types—

NOTE:—In certain cases it is not possible to check references in the original publication. Such references are marked with an asterisk.

1 and 7a. Type 1 has been divided into six subtypes. Using statistical methods, it was found that the chance of a cow's harbouring more than one type increased with an increase either in the number of quarters involved or in the number of infections experienced.

Streptococci other than *Str. agalactiae* and not belonging to group B were isolated from 73% of the cows or 31% of the quarters during the first lactation. During the second lactation they were recovered from 90% of cows or 59% of quarters. The incidence of these infections was similar to that of *Str. agalactiae*, but only in one case did they produce persistent infections and at no time did they produce mastitis.

Haemolytic staphylococci were recovered, during the first lactation, from the milk of 30% of the cows or 17% of the quarters. Six of these quarters developed clinical staphylococcal mastitis. In the second lactation period, haemolytic staphylococci were recovered from the milk of 46% of the cows or 18% of the quarters, of which six developed mastitis.

Non-haemolytic micrococci were found to be common invaders of the udder but not to cause clinical mastitis. During the first lactation, micrococci were recovered from 60% of the cows or 37% of the quarters, while during the second lactation the figures were 86% and 64% respectively. Corynebacteria were isolated only once and anaerobic bacteria not at all.

Str. agalactiae was recovered from the faeces of seven cows and from sores on the teats on two occasions. Unweaned calves appeared to have no effect, either beneficial or harmful, as judged by the bacterial status of the udder. Overstocking during the "drying-off" period tended to increase the bacterial count of the milk. A few attempts to control the bacterial flora of the udder by sealing the teats were unsuccessful.

Systematic bacteriological examinations were also carried out at fortnightly intervals during the first lactation of 12 first-calf heifers in another herd. The results were similar to those obtained in the experimental herd.

Detailed clinical observations were also made on the experimental herd. Sores on the udders and teats were common. They were apparently due to staphylococci and no virus could be found. There was nothing to suggest that the sores were responsible for infections inside the udder. Bacterial infections in the quarters had no appreciable effect on the yield of milk unless clinical mastitis developed. Clots were found frequently in the milk from sterile quarters, but were somewhat more frequent in quarters in which bacteria had become established. In several cases a quarter at first yielding normal milk suddenly developed a haemorrhage during the milking, possibly due to the reduction in pressure inside the udder. Such haemorrhages may account for the clots in sterile quarters. Hypertrophic verrucose lesions of the lining membrane of the teat canal, producing so called "peas" on palpation, developed in 39 out of 203 quarters under observation. These were apparently not caused by bacteria. The cows were divided into high, medium, and low yielders and it was found that mastitis was much more prevalent in the low than in the high producers. Further, there was nothing to suggest that large teat orifices rendered the udder more susceptible to mastitis.

The cell counts remained low in milk from quarters which remained sterile, only 8% exceeding 100,000 per ml. Counts of 200,000 per ml. or more were given by 59% of quarters with pure micrococcal infections, by 83% of those with pure staphylococcal infections and by 84% of those with pure streptococcal infections.

In a discussion of the results, attention is drawn to the fact that infections with *Str. agalactiae* were more transient than those with micrococci and staphylococci. Possible reasons why *Str. agalactiae* failed to produce the typical chronic streptococcal mastitis are (a) that "epidemic strains" may have been excluded in the establishment of the herd, and (b) the youth of the cows, with consequent absence of preliminary damage to the udder by previous infections. The results have shown that the infected udder is not the only reservoir of *Str. agalactiae*. Methods of control based on the assumption that it is may meet with only partial success.—W. I. B. Beveridge.

Stewart, D. F. (1941). **The Occurrence in New South Wales of Bovine Mastitis Associated with** *Streptococcus dysgalactiae*.—*Aust. vet. J.* **17.** 18–19.

Str. dysgalactiae was isolated from the milk of four cows showing abnormal cellular deposits. It had not previously been recorded in New South Wales.—W. I. B. Beveridge.

Cone, J. F. (1940). **The Leucocyte Count and the Chloride Content of Milk from Bovine**

Udders with Mild Streptococcic Infections.—*J. Milk Technol.* **3.** 341–345.

In an unselected group of cows of various ages and in all stages of lactation it was found that no arbitrary values can be selected for the chloride and leucocyte tests which can be used to distinguish with certainty between infected and uninfected quarters. But a comparison of the results from a particular quarter with previous results for that quarter or with the other quarters of the same cow may form a guide to the condition of the quarter. A sudden rise in the chloride content and leucocyte count usually indicates the presence of infection, even though the figures do not exceed the standards usually accepted as indicating the presence of streptococcic infection. Of the two tests, the leucocyte count is the more reliable guide as it is less likely to be affected by other factors, but neither is as reliable as a bacteriological test.
—GWILYM O. DAVIES.

VAN DEN BERG, W. (1940). Een nieuwe methode ter onderkenning van streptococcen en staphylococcen in de melk van klinisch normal uiers. [**A New Method for Identifying Pathogenic Streptococci and Staphylococci in Milk from Clinically Normal Udders**].—*Tijdschr. Diergeneesk.* **67.** 8–9.

A preliminary announcement of what is claimed to be a new, rapid, and reliable method of diagnosing streptococcal and staphylococcal infection of the udder. The technical details were presumably to have been divulged later.
—L. TOBBACK.

BAZELEY, P. L. (1940). **Studies with Equine Streptococci. 2. Experimental Immunity to Str. equi.**—*Aust. vet. J.* **16.** 243–259. [For part I, see *V. B.* **11.** 738].

Successful immunization of small animals against *Str. equi* has not been previously reported; B. investigated the possibility of obtaining immunity with cautiously heat-killed cultures. When mice were used as test animals, young-culture vaccines were found to possess much greater immunizing powers than old-culture vaccines, although the latter produced some degree of immunity. Effective vaccines were found to consist mainly of capsulated organisms; it is therefore considered that the immuno-antigen is associated with the capsules or at least that the two are coincidental.

Effective vaccines were found to sediment much more slowly than poorly immunizing vaccines, this being due apparently to strongly repulsive surface charges on most organisms in the former vaccines.

By means of a specially designed apparatus, *Str. equi* cultures were exposed to heat for very short intervals of time. Exposure to 56°C. for 0·9 min. was found to be lethal. Such short exposure, however, had no appreciable advantage over somewhat longer exposures in an ordinary glass flask or test-tube.

Injection of 10 million cautiously heat-killed organisms in mice protected against a small lethal dose (1 minimum test dose). Antiserum prepared in rabbits by a course of injections of such vaccines protected mice against lethal doses of culture.—W. I. B. BEVERIDGE.

YETKIN, R. (1938). Formollü gurm streptokok kültür ve filtralarile findik farelerinde asilama tecrübeleri. [**Vaccination of Mice with Formolized Strangles Streptococci and Their Filtrates**].—*Askeri vet. Mecmuasi.* **15.** 318–322. [Abst. from French summary].

Y. attempted to produce an immunizing agent against strangles by formolizing (1) a culture of *Streptococcus equi* and leaving it for 17 days in an incubator, (2) a culture filtrate of *Str. equi*, and (3) a heat-killed and autolysed *Str. equi* culture.

Mice vaccinated with any of these products acquired no immunity against infection with the same strain of *Str. equi*.

SIMMONS, R. T., & WILSON, H. (1941). **Cultivation of β-Haemolytic Streptococci on Maltose-Blood-Agar: A Presumptive Test for Group A.**—*Med. J. Aust.* Jan. 18th. 74–77.

It was found that on maltose-blood-agar, streptococci of group A produce little or no haemolysis and group B strains produce a deep-cream or dark-brown coloured growth. Members of groups C and G behave as on ordinary agar. Out of 500 group A strains only four escaped detection by examination of growth on maltose-blood-agar. All of 120 group B strains were recognized by this method. Groups C and G cannot be distinguished from one another by this means.—W. I. B. B.

MORRISON, J. E. (1941). **The Physiology of Capsulated Streptococci.**—*J. Path. Bact.* **53.** 1–12.

Capsulation of three strains of group A (Lancefield) streptococci was readily obtained by growth in glucose-serum broth. Capsular development, which varied with the strain and culture media, ceased before the onset of the period of marked growth decline. It appeared to depend upon whether synthesis outweighed destruction, and, although capsules were well marked for up to 24 hours at 18°–20°C., all attempts to inhibit disintegration of the capsules by the use of temperatures above 37°C. failed. At 0°–4°C., however, little breakdown could be detected for several days.

Capsular disintegration, on which sulphanilamide had no effect, was accelerated by lethal concentrations of ethyl alcohol, but was retarded by 0·5–1 % formalin. $HgCl_2$ (1 : 1,000) gentian violet (0·2 %), and CO_2 (to saturation), failed to inhibit the breakdown, whilst a dilution of 1 : 5 of bile caused almost complete disintegration in 30 min. at 18°C.

The thermolabile capsule-destroying enzyme released during disintegration of the capsule was not identified, but was probably a substance more complex than hyaluronidase.

M. suggests that the fact that the mucins of joints, etc., contain relatively large amounts of the specific polysaccharide acid (hyaluronic acid) may account for the localization of those lesions that are attributed to streptococcal allergy, and, further, that the lack of "foreignness" of the capsular material may limit its utility as an immunizing agent.—E. Cotchin.

Gross, P., Cooper, F. B., & Phillips, J. D. (1941). **The Cytologic Response of Rats and Mice to a Strain of Greening Streptococci.**—*Amer. J. Path.* **17.** 377–384.

In rats, the cytologic response to repeated intracardiac injections of living cultures of a greening streptococcus was transiently leucocytic, and was rapidly followed by a predominately monocytic reaction. In the myocardium of more than one-third of the rats given four or more intracardiac injections, there were seen, usually in the interstitial, and occasionally in the perivascular, tissue of the ventricular myocardium, lesions resembling the Aschoff bodies of rheumatic fever, but differing from these in the absence of a centre of necrotic collagenous material, and of a network of argentophile reticulum fibres. Similar monocytic foci were seen in the kidney, brain, and lung.

In mice, the cytologic response following intravenous injection of the same strain of streptococcus was essentially similar to that in the rat, but was milder, and no lesions resembling Aschoff bodies were formed.

Since most of the rats failed to respond to further injections by new abscess formation in the various organs, it is considered that the monocytic response is the reaction of an immune or partially immune host to a pathogen of relatively low virulence, and that the formation of giant cells and of structures resembling, but not identical with, Aschoff bodies, is a non-specific modification of the general reaction.

—E. Cotchin.

Bayliss, M. (1940). **Studies on the Mechanism of Vomiting Produced by Staphylococcus Enterotoxin.**—*J. exp. Med.* **72.** 669–684.

The emetic action of enterotoxin, obtained from a strain of food-poisoning staphylococcus and deprived of its lethal toxin by exposure to 100°C. for 20 min., was tested on young and adult cats under various experimental conditions. Emesis resulted from intravenous, intracardial, and intraperitoneal injection of enterotoxin, but not from oral, subcutaneous, or intramuscular administration. The effect upon emesis, with or without an injection of enterotoxin, of the removal of various parts of the alimentary canal or of the destruction of certain nerve tracts was studied. Emesis due to the injection of enterotoxin was inhibited by morphine, inhibited or delayed by ergo-toxin, and unaffected by atropine or pentobarbital. The action of the enterotoxin on peripheral sensory structures was shown to be more important in the production of emesis than its direct action upon the vomiting centre.

—R. O. Muir.

Christie, R. (1940). **The Use of Slide Agglutination to Determine Pathogenicity of Staphylococci.**—*Aust. J. exp. Biol. med. Sci.* **18.** 397–400.

A mixture of three antisera prepared against coagulase-positive strains of staphylococci was found to agglutinate 257 out of 269 coagulase-positive strains from human and animal sources. Nine of the remainder were auto-agglutinable and could not be tested. Of 123 coagulase-negative strains, 120 were not agglutinated by the same mixed antisera. Results of both the coagulase and agglutination tests accorded well

with the classification for pathogenicity based on source. It is concluded that agglutination with pooled serum may be used as a laboratory test for pathogenicity, although its value is limited by the occurrence of auto-agglutinable strains.—W. I. B. BEVERIDGE.

WEST, R., & COBURN, A. F. (1940). **The Relationship of Sulfapyridine, Nicotinic Acid, and Coenzymes to the Growth of** *Staphylococcus aureus*.—*J. exp. Med.* **72.** 91–97.

The bacteriostatic action of sulphapyridine upon *Staph. aureus* grown upon Knight's medium was exerted in the presence of nicotinic acid. Coenzymes and crude yeast extracts, both fresh and autoclaved, inhibited the bacteriostatic effect of the sulphapyridine. Highly purified yeast coenzymes also inhibited the bacteriostatic effect but an autoclaved control failed to do so. Hence it is evident that substances other than enzymes are involved in the inhibition. There is a discussion of the possible relation of sulphapyridine, nicotinic acid, and coenzymes in connexion with bacterial growth.—ALFRED EDEN.

REIMERS, & MEYER. (1939). Milzbrandschutzimpfungen mit Lanolin-Vakzine. **[Protective Vaccination against Anthrax with Lanolin Vaccine]**.—*Berl. Münch. tierärztl. Wschr.* Nov. 3rd. pp. 661–662.

Vaccination of horses and cattle with lanolin vaccine was carried out in 1937 in two low-lying areas of Schleswig-Holstein where the pastures were liable to be flooded with the effluent from tanneries which cure imported foreign hides; the mortality from anthrax was high in these areas. In one group of farms 729 cattle and ten horses were vaccinated. One of the cattle died two days after vaccination, it being considered that this was due to a latent infection. A second bovine died 39 days after vaccination; no explanation was given for this death. Nine unvaccinated cattle and one horse died in this area in the rest of the year after vaccination. In a second group, 314 cattle were vaccinated and no deaths from anthrax occurred after this vaccination. Three unvaccinated cattle died after ingestion of hay from the infected pastures. No data are given of the dosage or method of preparation of the vaccine.—E. C. H.

HENSCHEN, F. (1941). Tuberkulosens historia, utbredning och former i Skandinavien. **[The History of TB. in Scandinavia]**.—*Skand. VetTidskr.* **31.** 130–149. [English summary].

This deals with TB. in the human population. In Sweden, TB. in cattle does not appear to play an important part as a source of infection for man and the part of the country in which there is the highest incidence of TB. in man is far from that in which bovine TB. is most prevalent. A map is given purporting to show the incidence of bovine TB. in 1938; it indicates that the "frequency" was greatest in Skaraborg with 41–50%. [The basis of estimation is not stated, but the civil veterinary report for Sweden (1938) shows that the percentage of reactors to the tuberculin test in Skaraborg was only 14·9% of 8,164 cattle. It seems unlikely that more comprehensive data are available to render this figure invalid.]

In Denmark it is known that bovine TB. plays a more important role in the incidence of human TB. Some figures are quoted.—J. E.

GRÓH, E. (1939). Ueber das gleichzeitige Vorkommen von humanen und bovinen Bacillen bei der Tuberkulose der Rinder. **[Simultaneous Occurrence of Human and Bovine Type Bacilli in Bovine TB.]**.—*Z. Hyg. InfektKr.* **122.** 62–71.

Up to 1932 there was no record of the isolation of human type bacilli from tuberculous lesions in cattle. Since then Dutch and Scandinavian workers have reported cases of human type infection in cattle. G. here reports the isolation of bovine and human type tubercle bacilli from 25 tuberculous cattle [no details of origin etc.]. Cultures made from the tuberculous material on glycerin-asparagin-egg medium produced two kinds of growth in the one of which "bacilli of bovine structure" were seen and in the other "bacilli of human structure".

Although human type bacilli (h.t.b.) grow normally much faster than bovine type bacilli (b.t.b.) when in separate cultures, this did not occur in G.'s mixed colonies: on the contrary the presence of both types together resulted in a marked acceleration in the rate of growth of the b.t.b. and a retardation below the growth rate of the latter of that of the h.t.b. The normal growth rate factor could thus not be utilized in the cultural separation of the two types, neither was it possible to pick out colonies of h.t.b. from the mixed colonies unless the material picked out was broken up by the dilution and glass bead method and serial cultures made. In this way the h.t.b. were

isolated in purity in the 3rd–15th generation.

For details of the cultural methods and appearance of the colonies on solid and liquid media, the original should be consulted.—J. E.

*Stenius, R. (1941). Tuberkulosiparantola nautaeläinten vastavaikutusten syynä. **[The Influence of a TB. Sanatorium on the Health of Cattle]**.—*Suom. Eläinlääkäril.* p. 105. [Translation of abst. in *Skand. VetTidskr.* **31.** 172].

Waste-water from a TB. sanatorium was run into a septic tank system and after "cleansing" was run into a brook by the side of which cattle grazed. Before 1938 these cattle were non-reactors to the tuberculin test, but after that year several of them began to react in the manner typical for human type infection.

On investigation it was found that the waste water from the septic tank system contained live tubercle bacilli and that cattle which drank water from the brook began to react to tuberculin within a period of two months.

Mazzaracchio, V. (1938). Osservazioni e ricerche sulla mastite tubercolare della vacca. **[Tuberculous Mastitis in Cows]**. —*R.C. Ist. Sanit. pubbl., Roma.* **1.** 718–734.

This is a general review and discussion on tuberculous mastitis with special reference to histopathology and diagnosis. M. distinguishes four types of tuberculous infection of the mammary tissue, *viz*, diffuse, lobular, nodular, and caseous, the last being a late stage of either of the others, which differ merely in the extent to which the tissue is invaded.—J. E.

Keller, H. (1940). Ueber Tuberkulose des Magens und der Lnn. gastrici beim Schwein. **[TB. of the Stomach and Gastric Lymph Nodes in the Pig]**.—*Z. Fleisch- u. Milchhyg.* **50.** 221–224.

Although TB. of the gastric lymph nodes in the pig is not uncommon, it is extremely rare to find macroscopic or histological evidence of TB. in the stomach. K. observed only a single case of TB. of the stomach during a macroscopic examination of this organ in about 1,000 tuberculous pigs, in 50 of which portions of the stomach wall were examined histologically. The case encountered showed thickening of the stomach wall near the pylorus with granulation tissue in the subserosa and a number of small tubercles in the muscularis; the mucosa was normal.

The gastric lymph nodes may become infected from neighbouring tuberculous nodes —portal, coeliac, duodenal. This may take place by direct contact (coeliac) or by anastomosis of efferent vessels of the various nodes. In addition, the gastric nodes receive lymph from the diaphragm and pancreas and this offers another possible route of infection.

K. concluded that it is not necessary to condemn the stomach in cases in which the gastric nodes are tuberculous, provided that no tuberculous lesions are visible on macroscopical examination of the stomach. He recommends that the German meat-inspection regulations should be amended accordingly.—E. G. White.

Pasricha, C. L., Panja, G., & Banerjee, K. (1940). **Intracutaneous Inoculation of Guinea-Pigs for the Diagnosis of Tuberculosis.**—*Indian med. Gaz.* **75.** 20–22.

The authors found that intracutaneous inoculation of g. pigs gave better results for diagnostic purposes than subcutaneous, intramuscular, or intraperitoneal inoculation; the result was obtained more quickly (7–14 days), and the same g. pig can be used for at least four different tests, provided that the injection sites selected are drained by different groups of lymph nodes. Diagnosis is made from scrapings of the ulcer. —L. Sahai.

Wessels, C. C. (1941). **Tuberculosis of the Rat. I. Gross Organ Changes and Tuberculin Sensitivity in Rats Infected with Tubercle Bacilli. II. The Fate of Tubercle Bacilli in the Various Organs of the Rat. III. The Correlation between the Histological Changes and the Fate of Living Tubercle Bacilli in the Organs of the Albino Rat.**—*Amer. Rev. Tuberc.* **43.** 449–458, 459–474 and 637–662.

I. Groups of rats were infected intravenously with 0·1 mg. or 0·001 mg. of virulent strains of either bovine, human, or avian type tubercle bacilli. Tuberculous lesions appeared in all the visceral organs but caseation did not occur. The lesions produced by the bovine type bacilli were the most severe. The affected rats developed a slight, atypical tuberculin sensitivity. At no time did they show any symptoms of disease; in fact they developed normally and gained in weight.

Only a slight sensitization could be induced in similar rats by the repeated intracutaneous

inoculation of tuberculo-protein. Precipitins were developed but a typical Arthus phenomenon could not be induced.

II. Using cultural methods, W. has shown that immediately following intravenous injection, tubercle bacilli are deposited in the various organs in the following decreasing order :– liver, lungs, spleen, tracheo-bronchial lymph nodes, and lastly the kidneys. There is a preliminary multiplication of both the mammalian and the avian types of bacilli. After the multiplication has reached a peak, destruction of the micro-organisms commences in all organs, rapidly at first, and finally a state is reached when the number destroyed is replaced by approximately an equivalent number of young organisms.

From these studies it is inferred that the rat is a resistant animal because both the lungs and the kidneys (the susceptible organs in the rabbit) have the power of destroying bovine type bacilli. It is pointed out, however, that the difference in the behaviour of the rat and the rabbit towards the tubercle bacillus is more quantitative than qualitative.

III. Histological observation of the tissues of rats killed at varying intervals after receiving intravenous injections of either mammalian or avian tubercle bacilli showed that both types stimulated the accumulation and multiplication of mononuclear cells which underwent transformation to young epithelioid cells. In the early stages of, and synchronous with, the period of active multiplication of the bacilli, the lesions were diffuse. Later, following the destruction of many bacilli, the lesions became discrete, especially in the liver and spleen. In the lungs, where the destruction was least effective, the lesions retained their diffuse character even after three months. Caseation did not occur and the destruction of many bacilli probably explains the resistance of the rat to the progress of the disease. TB. of the rat resembles leprosy as it occurs in man and Johne's disease in cattle, where the bacilli remain essentially in symbiotic relation to the cells and where sensitivity to the respective micro-organisms is little developed.—J. S. P.

ANGEVINE, D. M., & HUNTINGTON, R. W., Jr. (1941). **Experimental Ocular Tuberculosis in Normal and Immunised Rabbits.** —*Amer. J. Path.* **17.** 155–163.

TB. of the eye occurred in 28 (49·1%) out of 57 rabbits which had received 0·00001 mg. of bovine type tubercle bacilli intravenously. Rabbits which had been immunized with heat-killed human or bovine type bacilli were more resistant, as only 37 (27·2%) out of 136 became affected in the eye. Larger doses of living bacilli (0·01 mg.) gave a large percentage of ocular TB. The incidence of ocular TB. bore a close relationship to the extent to which the disease had progressed in the lungs.

The lesions were most commonly found in the posterior part of the iris and in the region of the ciliary body. Nodules in the latter area were frequently large and caseous and often perforated the eye at the corneo-scleral junction. Lesions were also common in the ciliary processes.

There was no relationship between skin sensitivity to tuberculin and the degree of TB. in the eye, nor did the latter influence antibody formation as determined by the complement-fixation test.—J. S. PATERSON.

KRISHNA IYER, P. R. (1940). **Tuberculosis in the Monkey Caused by Bacilli of the Bovine Type.**—*Indian J. vet. Sci.* **10.** 271–275.

TB. is described in a male and a female Abyssinian baboon (*Cynocephalus babouin*) which had lived together. The bovine type of bacillus was isolated from one animal.—L. S.

HIGNETT, S. L., & MACKENZIE, D. A. (1940). **The Occurrence of Tuberculosis in the Starling (*Sturnus v. vulgaris* L.).**—*Vet. Rec.* **52.** 585–587.

While investigating the source of infection in an outbreak of TB. in a flock of poultry, the authors carried out a number of P.M. examinations on different species of wild birds found in the neighbourhood. Positive results were obtained in three starlings. Further examinations of starling material yielded positive results in 12 cases out of 252, *i.e.* 4·8%, but, since only those cases which showed very obvious lesions were examined, the true figure is likely to be higher. Examination of a number of alimentary canals of starlings and of excreta gave results which also pointed to the importance of the starling as a vehicle of infection.

—J. R. LAWSON.

SPALATIN, J. (1940). Dezinfekcijski pokusi kod tuberkuloze peradi. **[Value of Some Disinfectants on Avian Tubercle Bacilli].**—*Vet. Arhiv.* **10.** 139–147. [Abst. from French summary].

S. studied the bactericidal action of lysochlor (50% solution of *p*-chlor-*m*-cresol), caporit "Jajce" [presumably the Bayer product], creolin, and phenol on nine strains of avian tubercle bacilli. The tests were carried out by the *in vitro* method of Hailer on strips of batiste, using Petragnani's medium. Lysochlor was also tested *in vivo* by intravenous injection.

The results were as follows :- (1) lysochlor destroyed the bacilli at a concentration of 0·125% in 2 hours, at 0·25% in 30 min., at 0·5% in 8 min., and at 1% and 2% in 2 min. *in vitro* [the *in vivo* tests and their results are not made clear in the summary]; (2) 0·25% caporit solution destroyed the bacilli in 4 hours, 0·125% and 0·1% in 1 hour, and 0·05% in 2 hours; (3) a 3% solution of creolin destroyed the bacilli in 4 hours, and a 5% solution in 1 hour; (4) 5% phenol destroyed the bacilli in 2 min.

S. concludes that lysochlor was the most efficacious of the disinfectants tested, in view of its bactericidal action at relatively low concentrations, *in vitro* and *in vivo*, and its lack of harmful effects on the subject.

BOURGEOIS, E. (1940). Ein Fall von paratuberkulöser Darmentzündung bei einem Edelhirsch. **[Johne's Disease in a Red Deer]**.—*Schweiz Arch. Tierheilk.* **82.** 514–515.

A red deer and a Japanese deer were purchased from a park in eastern Switzerland and kept together with a purchased fallow deer in a paddock in central Switzerland. After three months the first two deer had become emaciated. The Japanese deer died and was not examined, whilst the red deer was killed *in extremis* after a further four months. It was examined at an abattoir and characteristic lesions of Johne's disease in cattle were found and acid-fast bacilli were observed in smears of the colonic mucosa.—J. E.

NANDA, P. N., & SINGH, G. (1940). **Paratuberculous Enteritis of Sheep at the Hissar Cattle Farm.**—*Indian J. vet. Sci.* **10.** 276–279.

The authors describe the occurrence of Johne's disease in two ewes.—M. K. S.

TARANTINO, G. (1939). Morva e melioidosi. Rapporti etiopatogenetici. **[Glanders and Melioidosis]**.—*Azione vet.* **8.** 267–281.

This is a review of present knowledge of melioidosis, of the causal agent *Pfeifferella whitmori*, and of the relationship of the latter to the glanders bacillus.—MILLER WATSON.

KARLSON, A. G., MOSES, H. E., & FELDMAN, W. H. (1940). **Corynebacterium equi (Magnusson, 1923) in the Submaxillary Lymph Nodes of Swine.**—*J. infect. Dis.* **67.** 243–251.

The submaxillary lymph nodes of 114 abattoir swine were examined bacteriologically and by animal inoculation for the presence of *Corynebact. equi*. The bacteriological and serological studies of the strains isolated are described in detail. No acid-fast forms were demonstrated in the 26 strains isolated. In 20 cases, *Corynebact. equi* was found to be coexistent with tuberculous infection. *Corynebact. equi* was resistant to the action of 2·5% oxalic acid for 60 min.; NaOH was found to be considerably more lethal to the organism. Young pigs were fed a heavy suspension of the organism mixed in mash, and 42 and 73 days later no agglutinating or complement-fixation antibodies were demonstrable in the sera of any of the pigs. No gross lesions were observed at P.M. examination on the 73rd day; *Corynebact. equi* was isolated from the submaxillary lymph nodes of each pig. The authors compare their results with those of other workers [see *V. B.* **11.** 77].—E. C. HULSE.

AITKEN, W. A. (1940). **So-Called Haemorrhagic Septicemia.**—*J. Amer. vet. med. Ass.* **96.** 300–304.

Few diseases of domestic animals have been the subject of more controversy amongst veterinarians than haemorrhagic septicaemia. A. discusses the reasons which have led to this, *e.g.* whether the pasteurella is present as an aetiological factor or whether it is merely a secondary invader, and describes the history, symptoms, and P.M. appearances of the disease. He then deals with the various conditions in cattle (including coccidiosis, clover poisoning, influenza, shipping fever, etc.) which have been, and still are, wrongly diagnosed as haemorrhagic septicaemia, and describes in similar fashion the ovine, equine, and porcine conditions which have, or may, come under the same category. Although having excellent laboratory facilities available for diagnosis, he has, in the course of eight years, failed, with one possible exception, to have pasteurella identified in material from

suspected cases, and he suggests that, if such laboratory assistance were more generally available, fewer cases of haemorrhagic septicaemia would be diagnosed.—J. R. LAWSON.

BHATNAGAR, S. S. (1940). **Bacteriological Studies on *Pasteurella pestis* and *Pasteurella pseudotuberculosis*. Part I. The Morphology, the Growth and the Dissociation of *Pasteurella pestis*. II. The Serology of *Pasteurella pestis* and *Pasteurella pseudotuberculosis*.**—*Indian J. med. Res.* **28.** 1–15 and 17–42.

I. A systematic investigation was made of the morphology, growth on different media and at varying temperatures, and the colonial appearance of 92 strains of *Past. pestis*, collected from various parts of the world.

II. Methods are described of obtaining stable suspensions of virulent, protective avirulent, and non-protective avirulent strains of *Past. pestis* as well as of *Past. pseudotuberculosis*, and of producing in rabbits immune sera of high agglutinating titre against these organisms. A serological study of both organisms by agglutination and agglutinin-absorption tests demonstrated the presence of a common antigen, but, although a plague antiserum agglutinated all *Past. pseudotuberculosis* strains, a pseudotuberculosis antiserum did not react with any *Past. pestis* strain. In a study of the serological interrelationship between different *Past. pseudotuberculosis* strains, three antigens were shown to exist, *viz*, a common group antigen, present also in *Past. pestis*, a group-specific antigen shared only by certain strains, and a type-specific antigen possessed by individual strains. A description is given of the effect of heat and of various chemicals on the agglutinability of *Past. pestis* and *Past. pseudotuberculosis* suspensions.—R. O. MUIR.

BEAUDETTE, F. R. (1940). **A Case of Pseudotuberculosis in a Blackbird.**—*J. Amer. vet. med. Ass.* **97.** 151–157.

B. states that pseudotuberculosis has never previously been reported in blackbirds and he describes a case in the U.S.A. When found, the bird was lame and emaciated and showed symptoms of diarrhoea. It died, and a few raised, glistening, yellowish or greyish nodules were found on the surface and also on the parenchyma of the liver. An organism which satisfied all the characteristics of *Pasteurella pseudotuberculosis rodentium* was obtained in culture from these nodules. B. reviews the literature concerning the occurrence of this infection in birds.—J. R. LAWSON.

FENSTERMACHER, R., & POMEROY, B. S. (1941). **Encephalitis-like Symptoms in Turkeys Associated with a *Pasteurella sp.***—*Cornell Vet.* **31.** 295–301.

In an outbreak of disease, characterized by muscular incoordination, 200 of a flock of 3,500 turkeys died in a month. From the cerebellum of three birds examined, there was isolated a small, non-motile, non-haemolytic, bipolar-staining organism, considered from its characters to be an atypical *Pasteurella*. It was pathogenic to rabbits by the intracranial and intravenous routes, and to Swiss mice by the intracranial route. In turkeys, inconsistent results were obtained, seven out of 20 birds being killed by intracranial inoculation, and two out of five by intravenous inoculation. The relationship of the organism to the disease in the turkeys was not determined.—E. COTCHIN.

DE TORREGROSA, M. V., & FRANCIS, T., Jr. (1941). **The Intracerebral Infection of Mice with *Hemophilus influenzae* as an Index of Strain Virulence and the Protective Value of Immune Serum.**—*J. infect. Dis.* **68.** 59–66.

An examination of a large number of strains of *H. influenzae* showed that a proportion, mainly of the S variety, was highly infective for mice by the intracerebral route. Virulence was apparently absent in strains cultivated on the usual artificial medium for any significant length of time.

Advantage was taken of this technique to titrate immune sera prepared in rabbits. These sera in fivefold dilutions ranging from 1 : 5–1 : 2,500 were mixed with infected mouse brain containing 200 M.L.D. and inoculated intracerebrally into fresh mice. The titre of the serum was calculated in terms of the amount which protected 50%; a potent serum gave this degree of protection in a dilution of 1 : 500, whereas sera prepared against R strains and normal rabbit sera were inert.—R. E. GLOVER.

STEWART, D. F. (1940). **Further Salmonella Infections in Pigs and Acute Paratyphoid Septicaemia in Horses.**—*Aust. vet. J.* **16.** 266–267.

S. previously reported [*V. B.* **11.** 671.] the isolation of *S. cholerae-suis* var. *kunzendorf* from diseased pigs in New South Wales. He now

reports the isolation of *S. typhi-murium* from pigs with necrotic enteritis and pneumonia, and *S. bovis-morbificans* from a pig with pneumonia, as well as further cases of infection with *S. cholerae-suis* var. *kunzendorf*.

Several deaths occurred in horses showing diarrhoea and pneumonia. On autopsy these animals showed very enlarged spleens, enteritis, pneumonia, and pleurisy. *S. typhi-murium* was isolated from three cases and *S. anatum* from a fourth.

The identity of all strains was established by serological means.—W. I. B. Beveridge.

Hungerford, T. G. (1941). **The Eradication of Pullorum Disease by the Rapid Whole Blood Stained Antigen Agglutination Test.**—*Aust. vet. J.* **17.** 11–15.

The rapid whole-blood aggln. test was used in an attempt to eradicate pullorum disease from a farm carrying 2,000–3,000 fowls. Three antigens of different density were tested and the least dense one was found to be the best. There was fair agreement with the tube test. At the first test, 40% of the birds were found infected. Seven tests were carried out over a period of two years. Each time the positive and suspicious reactors were isolated and the quarters were disinfected. Finally a tube test was made on the entire flock and only one positive and four suspicious reactions were obtained. An isolated group of positive and suspicious reactors had an egg production of 30% compared with 38% in negative reactors during a test period of 35 days. Prior to the institution of these control measures, only very occasional chicken mortality had occurred in spite of the high rate of infection.—W. I. B. B.

Stafseth, H. J., & Corbett, A. C. (1940). **Identification of Salmonella Pullorum Colonies with Immune Serum by Means of a Macroscopic Plate Test.**—*Amer. J. vet. Res.* **1.** 76–77.

The test described consists in picking a colony off a plate and testing it for agglutination by *S. pullorum* antiserum on a glass slide. *S. pullorum* colonies can be differentiated by this means from those of salmonella organisms other than *S. gallinarum*.—W. J. Ironside.

*—. (1941). Foreløpig melding fra Veterinaerdirektøren om resultatet av bekjempelsen av smittsom kasting pr 31 desember 1940. [**Norway : Report of the Veterinary Director on the Results of the Campaign against Bovine Brucellosis up to December 31st, 1940**].—*Norsk Vet-Tidsskr.* p. 69. [Abst. from abst. in *Skand. VetTidskr.* **31.** 170–171].

The campaign has been in operation for six years, during which period a total of 3,115 herds have been notified as infected; 3,077 (98·78%) of these herds have been freed from infection. Twelve herds contained no reactors at the last test and will be declared clean after passing another test. Only 26 herds remain infected. [For report for 1939, see *V. B.* **11.** 749.]

Coppo, M. (1940). Contributo allo studio delle alterazioni anatomiche da Brucella melitensis negli organi genitali dell'ariete. [**Anatomical Changes in the Genital Organs of Rams Infected with** *Br. melitensis*].—*Profilassi.* **13.** 15–20.

C. describes the lesions in two cases of orchitis caused by *Br. melitensis* in rams.

In the first case, the testicle was slightly enlarged and the tunica vaginalis somewhat hyperaemic. The organ was firmer than normal and at the caudal end of the epididymis there was a fluctuating swelling. Microscopically, the seminiferous tubules were seen to be undergoing degeneration with thinning of the hyaline and elastic coat and desquamation of the epithelium. The interstitial tissue was also affected and considerable areas of the organ were necrotic. The necrotic areas showed some degree of calcification and were surrounded by zones of cellular infiltration by leucocytes, lymphocytes, plasma cells, and monocytes. The epididymis was similarly affected.

In the second case, the organ was markedly enlarged, was harder than normal, and the serous coats were adherent. On section, the gland was dry and fibrous in appearance and the fibrous coats were much thickened.

Microscopically, the tubules were found to be degenerated as in the first case, but in this case there was great increase in interstitial tissue which was undergoing necrosis. Necrotic areas were surrounded by cellular zones and by thick capsules of fibrous tissue.—M. Watson.

Birch, R. R., Gilman, H. L., & Stone, W. S. (1941). **Calfhood Vaccination against Bang's Disease.**—*Cornell Vet.* **31.** 170–182.

Thirty-five calves were vaccinated with strain 19 and 23 kept as controls. Twenty-eight

of the vaccinated and 14 of the controls completed their second pregnancies. The remaining seven of the vaccinated group and nine of the controls were eliminated, sterility being the immediate cause of removal in most cases. Exposure to natural infection took place in an " exposure " barn when the heifers were in calf. For the first two pregnancies there was a significant difference in favour of the vaccinated animals in the abortion rate, percentage of spreaders, and percentage of reactors. The resistance was waning in the second pregnancy, judging from the acute spread of bacilli at calving time. Reactors were high in both groups but higher in the controls. The general picture was one of decided but partial immunity during the first and second pregnancies which tended to fade out gradually. Details of a number of animals are given. The authors draw attention to points as yet not known in regard to strain 19, such as the question of fixity of virulence, and outline some conditions in which they consider the vaccine can be usefully applied at the present time.

—S. J. GILBERT.

HARING, C. M., & TRAUM, J. (1941). **Is Calfhood Vaccination Against Brucellosis Still in the Experimental Stage?**—*J. Amer. vet. med. Ass.* **99.** 22–24.

The authors modify a previously expressed statement that the use of strain 19 was still in an experimental stage, although this remains true in the sense that all immunizing agents require additional study after they have been accepted by practitioners and others. In view of the following developments they believe that the vaccine is ready for use in calfhood vaccination whenever indicated :– (1) improvements in controlling fluctuation in antigenic power, (2) examination of manufacturers' samples by Bureau of Animal Industry, (3) official recognition as a suitable aid to co-operative control, and (4) the fact that it has been shown possible to build negative herds from badly infected ones by the use of strain 19 vaccine. Better means of immunization may be developed, but until then strain 19 vaccine is one of the best weapons available for combating the disease.

—S. J. GILBERT.

MCEWEN, A. D. (1941). **Further Evidence of the Inability of *Br. abortus* Strain 45(20) to Infect Non-Pregnant Cattle.**—*Vet. Rec.* **53.** 351-353.

Four cows which had received *Brucella abortus*, strain 45, 14 months previously, were infected with the more virulent strain 45(20). About two months later they were killed and the tissues examined for the presence of the latter strain. Two animals, one non-pregnant and the other pregnant, received the culture subcutaneously. The pregnant animal only was found to harbour the organism in the uterus and prescapular and femoral lymph nodes. A third non-pregnant cow infected intravenously was free from infection after the same interval, while the fourth cow died from acute piroplasmosis a few days after injection.

A non-pregnant heifer receiving 45(20) was found not to be infected at calving a year later, while in another heifer no serum agglutinins developed during the same period.

Thirty-three non-pregnant heifers in an abortion-free herd received, at monthly intervals, three doses of strain 45(20). None of these animals developed serum agglutinins and no brucella organisms were isolated from two heifers which subsequently calved.

The evidence from these experiments therefore supports the author's previous findings, that the inoculation of strain 45(20) into non-pregnant cattle causes neither infection nor the production of agglutinins.—S. J. EDWARDS.

ROWLANDS, W. T., & HARBOUR, H. E. (1941). **Commercial Live *Br. abortus* Vaccines.** —*Vet. Rec.* **53.** 289–293.

Eight " live " *Brucella abortus* vaccines prepared by six commercial firms were examined culturally and for toxicity for mice and virulence in g. pigs. Viability varied from good to very poor ; two of the vaccines were contaminated, one of these, described as " attenuated ", being badly so and containing no viable *Br. abortus* organisms. Inoculations made directly into eight g. pigs produced in three slight lesions from which the organism was recovered. Toxicity for mice of strains recovered from the vaccines showed that one of the vaccines was moderately virulent, while two were partly virulent, one of these, described as " avirulent ", being more toxic than normal vaccines produced by the same firm, but of very poor viability. A plea is made for official control of standardization and restriction of sale of live *Brucella* vaccines.—S. J. EDWARDS.

AJELLO, P. (1939). Osservazioni e ricerche sulla localizzazione uterina della Brucella

melitensis nella cagna. **[Uterine Localization of *Br. melitensis* in the Bitch].**—*Nuovo Ercol.* **44.** 321–342.

Having isolated *Br. melitensis* from the uterus of a non-gravid bitch, A. carried out a number of experiments on the localization of this organism in bitches.

Seven pregnant bitches were inoculated with *Br. melitensis* and the uteri examined at periods varying for the various animals from 18–82 days after inoculation. In all cases *Br. melitensis* was isolated from the uteri.

Three bitches were inoculated soon after parturition and two of them proved to have uterine infection with *Br. melitensis* when examined 20 days later.

Eight non-pregnant bitches were also inoculated and in one case only was *Br. melitensis* isolated from the uterus. In this case the uterus contained placental remains and in this respect resembled the case which suggested the experiments. A. concludes that *Br. melitensis* is placentotropic in the bitch.—M. WATSON.

FIORINI, B. (1939). Sulla prima esigenza culturale della Brucella abortus bovis isolata da materiale patologico passato attraverso la cavia. **[Culture of *Br. abortus* Isolated from Pathological Material after Passage Through G. Pigs].**—*Nuovo Ercol.* **44.** 133–141.

Br. abortus isolated from bovines and passaged through g. pigs did not lose its CO_2-sensitive character.—MILLER WATSON.

KATZ, J. S. (1941). **Brucellosis in Wildlife.**—*J. Amer. vet. med. Ass.* **99.** 24–27.

K. reviews the present knowledge on brucella infection in wild mammals and in birds other than the domestic fowl.—S. J. GILBERT.

I. FOSHAY, L. (1940). **The Laboratory Diagnosis of Undulant Fever.**—*Amer. J. clin. Path.* **10.** 176–187.

II. CALDER, R. M., KERBY, G. P., & BAKER, L. (1941). **Brucella, Pasteurella tularensis, and Proteus Agglutinins in Chronic Brucellosis.**—*J. Bact.* **41.** 593–604.

I. It is now recognized that there is in the U.S.A. a vast amount of widespread chronic illness, often without fever, and frequently with psychasthenic and neurasthenic reactions, which is really chronic brucellosis. The disease is endemic in communities closely associated with domestic animals and where dairy products are not properly pasteurized. It is believed that the chief causative agent is *Br. abortus*.

Cultural methods should be more generally used in diagnosis, but it is emphasized that, owing to the broad agglutinating properties of brucella antisera [see II], no organism should be identified as *Br. abortus* without a thorough biochemical study. In the chronic disease, blood cultures are seldom successful and indirect tests are then used. Of these the agglutination test is the most reliable, but it must be remembered that 6–10% of culturally proven acute cases never develop agglutinins. Intradermal tests with "brucellergen" and phagocytic tests are also used for diagnosis, as well as the intradermal injection of specific immune sera, controlled by the injection of a similar amount of normal serum. A reaction occurs when the antigen, namely brucella bacteria, is present in the patient. This type of test has been used with success in tularaemia, but its reliability in brucellosis is still uncertain.

It appears that the chief obstacle to the reliability of all indirect diagnostic tests in brucellosis is the apparent fluctuation in the immunologic state of the host. Comparative studies in endemic and non-endemic areas do indicate that on the whole indirect tests are reliable, and that the tremendous numbers of reactors which are being disclosed in certain regions represent a true picture, but the practice of making a definite diagnosis on the basis of a positive skin test or one or two negative agglu. tests cannot be defended. [See also *V. B.* **12.** 30.]

II. In a series of patients believed to be suffering from chronic brucellosis, the *Bacterium tularense* titre was not significantly varied, but in 13·5% of the patients the *Proteus* OX19 titres were significantly raised, and in 65·9% they were higher than the brucella titre. The authors suggest that this may have been due partly to relative agglutinability of the suspensions used. There is therefore a danger that these high titres may be interpreted as a positive Weil-Felix reaction.

FOSHAY [see I] has noted that his brucella antisera, from horses and goats, have always agglutinated *Proteus* O strains and almost always all the common organisms found in the intestinal tract of man including salmonella, colon, and typhoid organisms, as well as non-pathogenic organisms. The results of tests in which rickettsia and brucella antisera were absorbed by *Proteus* OX19, brucella, and *Bact.*

tularense were believed to be due to the protean nature of the *Proteus* OX19 antigenic complex. It is also suggested that brucella organisms possess a related complexity in antigenic structure.

[In order to assess the significance of some of the foregoing results it should perhaps be remembered that LOVELL [*V. B.* **5.** 437.] has shown that the sera of healthy animals, including horses, often contain " normal agglutinins " to quite high titres. See also *V. B.* **12.** 30.]

—JOHN FRANCIS.

MEYER, K. F., & EDDIE, B. (1941). **Laboratory Infections due to Brucella.**—*J. infect. Dis.* **68.** 24–32.

A review of the European literature on this subject shows that *Br. melitensis* is a very dangerous organism to human beings working with it in the laboratory, but there is little information relating to *Br. suis* or *Br. abortus*.

In response to a questionnaire, 74 brucella infections were reported by workers in 21 laboratories in the U.S.A. Blood cultures were obtained from only 34 out of 55 patients, 21 being *Br. melitensis*, 12 *Br. suis*, and 1 *Br. abortus*. About one-half of the patients had an illness of 1–2 weeks and the remainder a prolonged and serious malady extending over months. The handling of cultures and the preparation of suspensions is particularly dangerous, but the inhalation of contaminated dust may also set up the disease and it is concluded that, until a beginner can be implicitly trusted with the technique or has developed agglutinins or a phagocytic index above 5 and skin allergy, he should work only with *Br. abortus*. The pathways of brucella infection are manifold and in the environment of infected animals the susceptible person may contract brucellosis very easily, but it is suggested that practising veterinarians who are continuously exposed usually become latently infected and develop an immunity.

There is a useful review of early attempts to produce immunity with heat- and chemically-killed cultures; it is concluded that, although agglutinins are produced in this way, allergy and immunity do not develop and the phagocytic index is not increased. The great need for a safe immunizing agent both for laboratory workers and those naturally exposed to infection is stressed and the possibility of using attenuated *Br. abortus* cultures for this purpose is mentioned.—JOHN FRANCIS.

KREUZER, E. (1939). Zur Kenntnis serologischer Verwandtschaftsbeziehungen einiger pathogener Anaerobier. **[The Serological Relationship between Pathogenic Anaerobes].**—*Z. ImmunForsch.* **95.** 345–359.

The aim of the investigation was to classify types of pathogenic anaerobes by agglutination tests as contrasted with toxin neutralization. The immune sera and antigens used were those of the four types of *Clostridium welchii*, the three types of *Cl. oedematiens* [recognized by German workers], *Cl. chauvoei*, and *Cl. septique*. Readings were taken after 2 and 24 hours' incubation at 37°C. Both *Cl. welchii* Type C, and *Cl. welchii* Type D, antisera agglutinated with homologous antigen up to a dilution of 1 : 5,000 with both heated and unheated antigen. *Cl. welchii* Type B antigen agglutinated in homologous serum to 1 : 5,000 in *Cl. welchii* Type A, *Cl. oedematiens* type *haemolyticum*, *Cl. chauvoei*, and *Cl. septique* sera at a dilution of 1 : 10, both heated and unheated.

With *Cl. welchii* Type A only type-specific agglutination was obtained when unheated antigen was used: using heated antigen the organism agglutinated with all nine antisera up to 1 : 80 dilution. All four types of *Cl. welchii* agglutinated with *Cl. oedematiens* type *haemolyticum* serum in a 1 : 10 dilution. In each type of *Cl. welchii* the specific antigen was heat stable.

In investigating the three types of *Cl. oedematiens* (*novyi*, *gigas*, and *haemolyticum*), difficulties of auto-agglutination were overcome by thorough shaking of suspensions and quick reading of results. Types *novyi* and *gigas* were found to contain an identical heat-stable antigen and *haemolyticum* a heat-stable antigen specific for this type only. Each of the three types contained a specific antigen.

In the *Cl. chauvoei* and *Cl. septique* tests it was found that both contain a common heat-stable antigen. The former, in addition, contains an antigen-combining power. Comparable results were also obtained using complement-fixation tests.

It is concluded that the groups investigated can readily be divided by serological methods.

—D. L. ROBARTS.

BUDDLE, M. B. (1941). **The Production of Immunity against *Cl. welchii* Type D (Enterotoxaemia).**—*Aust. vet. J.* **17.** 3–11.

Experiments were undertaken to determine the immunity response in pregnant ewes and the consequent passive immunity in their lambs, following vaccination with different preparations of *Clostridium welchii* Type D toxoid. Six preparations were tried including alum-precipitated toxoid, zinc-chloride-precipitated toxoid, and formalinized culture. The highest degree of passive, transmitted immunity in lambs was obtained following the use of reinforced alum-precipitated toxoid, the virtues of which were shown to be partly due to the alum and partly due to increased antigenic content.

Although no passive, transmitted immunity, either antitoxic or antibacterial, was detectable in lambs from vaccinated dams immediately prior to active immunization at 3½ months of age, yet the immunity response of these lambs was appreciably lower than that of lambs from unvaccinated dams. The immunity response of lambs inoculated by the intraperitoneal route did not appear to be significantly superior to that resulting from subcutaneous inoculation.
—W. I. B. Beveridge.

Bongert, J. G. (1940–41). Beitrag zur Kenntnis der Entstehung der Totenstarre. I. Ursache und Wesen der Totenstarre. II. Ist die Entwicklung der Totenstarre bei Schlachttieren insbesondere bei Schweinen möglich? III. Experimentelle Verhinderung der Totenstarre. **[The Nature of Rigor Mortis. I. Origin and Course of Rigor Mortis. II. Possible Development of Rigor Mortis in Slaughter Animals, especially in Pigs. III. Experimental Hindering of Rigor Mortis]**.—*Arch. wiss. prakt. Tierheilk.* **75.** 223–230, 230–240, and **76.** 164–172.

I. B. states that rigor mortis is not due to coagulation of muscle protein as was previously believed. The initial change is associated with cessation of the blood stream, contraction of the muscles, and dehydration following the change of ion concentration as a result of the formation of neutral salts. As P.M. changes proceed, chemical changes occur resulting in the formation of lactic and phosphoric acids in the muscle fibres.

II. In slaughter animals the initial stage may start, but permanent rigor mortis does not proceed, as the carcass is opened and the viscera, particularly the liver, are removed forthwith. The chief source of glycogen for conversion into lactic acid is therefore lost. If the carcass is not properly cooled, a certain amount of lactic acid will be formed in the tissues.

III. Acting on the assumption that the process of rigor mortis proceeds only in an anaerobic medium, six dogs were injected immediately after death with atmospheric air and hydrogen peroxide. In each case rigor mortis was delayed, whereas in the controls it appeared within 2–3 hours. It is suggested that the oxygen liberated as a result of this treatment caused combustion of the glycogen in the liver and so prevented its being changed into sugar and lactic acid.—C. W. Ottaway.

Pasricha, C. L., & Panja, G. (1940). *Clostridium Botulinum* **in Samples of Calcutta Soil.**—*Indian J. med. Res.* **28.** 49–54.

Cl. botulinum toxin was demonstrated in four samples of soil from gardens in Calcutta. Normal g. pigs were killed by the toxin, but g. pigs protected with mixed botulinum Types A and B antitoxin survived. Separate A and B antitoxins were not available, but from collateral evidence obtained from a study of pure cultures it is concluded that the strains belonged to Type A.—V. R. Rajagopalan.

Savage, A., & Isa, J. M. (1941). **Mode of Infection with Actinomycetes.**—*Cornell Vet.* **31.** 314–316.

Six photomicrographs are given of an early actinomycotic lesion of the lip of a cow, with massive but localized infection. Near to, and apparently growing out of, portions of small awns in the lesion were tiny colonies of actinomyces. The authors consider that these observations indicate that the infection may follow penetration of animal tissue by awns of infected grain. [The lack of recorded cultural examination reduces the value of the evidence.]
—E. Cotchin.

*Harbitz, F. (1940). Bør "aktinomykose" i veterinaermedicinen oppstilles som en egen sykdom på rent anatomisk grunnlag, men med forskjellig etiologi? **[Should Actinomycosis be Regarded in Veterinary Medicine as a Single Disease on Anatomical Grounds but One having a Varied Aetiology?]**—*Norsk VetTidsskr.* p. 458. [Abst. from abst. in *Skand. VetTidskr.* **30.** 1263].

Merely a reiteration of the diseases caused by *Actinomyces bovis* (lumpy jaw), *Actinobacillus lignieresi* (wooden tongue), and by the staphylococcus causing actinomycosis-like disease in the bovine udder.

BARBONI, E. (1938). Ulteriori osservazioni sull'empiema della sella turcica nei bovini. Empiema della sella turcica e ipofisite actinobacillare. [**Empyema of the Sella Turcica and Actinobacillosis of the Pituitary Body in a Bovine**].—*Nuova Vet.* **16.** 285–289 and 319–323.

B. describes a case of actinobacillosis of the pituitary body in a cow, which had been diagnosed clinically as coenurus. The nasal and paranasal mucosae were covered with muco-haemorrhagic exudate and in parts there were fibrous nodules of various sizes. In the left lung there was a fibrous nodule at the border of the middle lobe. The cavity of the internal ear on both sides contained whitish, stringy pus. The meninges were normal except for a slight hyperaemia, but the pituitary contained granular pus typical of an actinobacillary lesion.

To explain the localization of the disease in the pituitary body, B. suggests that infection spread from the nasal cavities, or their mucosae, to the region of the sella turcica, *via* lymph vessels.—MILLER WATSON.

CANESTRELLI, O. (1939). Contributo allo studio delle micosi interne nel cane. [**Internal Mycosis in a Dog**].—*Nuovo Ercol.* **44.** 121–133.

Acid-fast, Gram-positive filaments and coccobacillary forms of about 1μ in thickness and diameter, considered by the author to be *Actinomyces canis*, were demonstrated in the tissues of a large ulcerating swelling in a flank of a dog. The swelling contained purulent centres and yellowish-coloured granules were present in the pus. There was no club formation in the colonies in the tissues.

Inoculation of g. pigs with infective material produced abscesses at the site of injection and the organism was recovered from the pus.

—MILLER WATSON.

RAJAGOPALAN, T. S. (1941). *Aspergillus* **Sp. as the Cause of Skin Disease in Animals.** —*Indian Vet. J.* **17.** 297–299.

R. records skin infection caused by *Aspergillus* sp. in a goat and a bullock. Diagnosis rested on microscopic examination of skin scrapings.—S. C. A. DATTA.

RAY, H. N., & IDNANI, J. A. (1940). **Observations on Bartonellosis in Dogs in India.**—*Indian J. vet. Sci.* **10.** 259–270.

Bartonella canis infection in dogs in India is recorded for the first time. There was high fever, inappetence, panting without any excitement, and a rapidly progressive pernicious anaemia. " Clean " non-splenectomized pariah dogs [age not given] were infected by subcutaneous inoculation of infective blood. The morphology of the organism is described.

—K. RAGHAVACHARI.

I. GREIG, M. E., & HOOGERHEIDE, J. C. (1941). **The Correlation of Bacterial Growth with Oxygen Consumption.**—*J. Bact.* **41.** 549–556.

II. GREIG, M. E., & HOOGERHEIDE, J. C. (1941). **Evaluation of Germicides by a Manometric Method.**—*Ibid.* 557–562.

I. The O_2 consumption of suspensions of *Staphylococcus aureus*, *Proteus vulgaris*, *Pseudomonas fluorescens*, and of a yeast, *Willia anomala*, during growth was measured in Warburg manometers and the density of growth estimated by direct counts or turbidity measurements. The O_2 consumption per cell in growing cultures was found to increase to a maximum value early in the logarithmic phase of growth and then slowly to decrease. The O_2 uptake of growing cultures was directly proportional to the bacterial content, and owing to this fact a suggestion is made that measurement of the rate of O_2 uptake constitutes a consistent method for the measurement of the rate of growth.

II. The fact that the rate of O_2 uptake of multiplying bacteria is directly proportional to bacterial content, was made the basis for the development of a manometric method for the evaluation of germicides. Inhibition of the normal rate of increase of O_2 uptake when a germicide was added was due to a corresponding inhibition in growth. Germicides in bacteriostatic concentrations had no effect on metabolic rates of bacteria, but inhibited cell multiplication.—ALFRED EDEN.

ASHER, L. M., & SOKOL, J. K. (1941). **Bacterial Localization in the Kidneys.** —*Amer. J. Path.* **17.** 273–282.

The excretion of live bacteria in the urine was studied in six adult male rabbits which had been injected intravenously with 24-hour

broth cultures of *Staphylococcus aureus*, *Bacterium coli*, and *Salmonella typhi*. Samples of urine were withdrawn, at intervals of 5–120 min., from the bladder after it had been exposed under nembutal anaesthesia and were plated in 1·0 c.c. amounts in deep agar and incubated for 48 hours. Results indicated that the normal kidney usually does not excrete living bacteria present in the circulating blood. An investigation of the effect of experimental hydronephrosis, set up by ureteral ligature, upon renal ability to remove either living or inert particles (India ink or *Staph. aureus* and *Bact. coli*) from the blood, showed that there was an increased tendency for localization in the hydronephrotic kidney due to stasis, the sterile inflammatory process, and phagocytosis.

—R. O. Muir.

Fildes, P. (1940). **Indole as a Precursor in the Synthesis of Tryptophan by Bacteria.** —*Brit. J. exp. Path.* **21.** 315–319.

Certain bacteria such as various strains of *Salmonella typhi*, *Corynebacterium diphtheriae*, and staphylococci, previously shown to be unable to grow in the absence of tryptophane, are, however, capable of using indole in place of it. The deduction is made that tryptophane is synthesized by bacteria from ammonia in a number of stages, one of which is indole. The present evidence is adduced in support of the hypothesis that failure to grow is due to failure to synthesize.—Alfred Eden.

DISEASES CAUSED BY PROTOZOAN PARASITES

Vanderplank, F. L. (1941). **A Note on the Relation between the Virulence of *Trypanosoma rhodesiense* towards Rats and the Normal Blood Temperature of its Previous Mammalian Host.**—*Trans. R. Soc. trop. Med. Hyg.* **35.** 43–46.

Examination of transmission experiments with Corson's strain of *T. rhodesiense* revealed that the percentage of infected *Glossina morsitans* varied from 1% in flies fed on goats (normal temperature 102·8°F.) to 9·6% in flies fed on Thomson's gazelle (normal temperature 98·7°F.), and that whilst the average life of rats infected from the former flies was 64 days, the average life of rats infected from the latter was only 31 days. In a series of eight different species of mammalian hosts, the percentage of flies developing infection varied inversely, and the length of life of inoculated rats varied directly, with the normal temperatures of the mammalian hosts.

It is admitted that the numbers are too small to make the correlation statistically significant.

—U. F. Richardson.

Craige, J. E. (1941). **Infection of Chick Embryos and Chicks with Trypanosoma equiperdum by the Intravenous Route.** —*Vet. Bull. U.S. Army.* **35.** 38–45.

C. found that *T. equiperdum* will multiply rapidly in the blood when injected intravenously into chick embryos. This method requires shorter incubation periods and "infection is less variable" than when inoculation is made into the chorio-allantoic cavity. Eighteen egg-to-egg passages were carried out successfully and there was no reason for supposing that growth would not be indefinite. Results showed that the blood of 25% of intravenously inoculated chicks was infected.

—C. Horton Smith.

Christensen, J. F. (1941). **The Oöcysts of Coccidia from Domestic Cattle in Alabama (U.S.A.), with Descriptions of Two New Species.**—*J. Parasit.* **27.** 203–220.

Little is known of the relative pathogenicity, distribution in the host tissues, and morphology of bovine coccidia, and there are difficulties in obtaining reliable comparative pictures of the details of the life-history which involves the use of pure cultures and coccidia-free hosts under experimental conditions. Until such time as detailed studies of the whole life-histories can be made it seems advisable to elaborate a system of diagnosis based on the comparative morphology and sporulation times of oocysts. C. has made a survey of oocysts from healthy and infected cattle at Auburn, Alabama, with a view to deciding whether the groups of oocysts previously recorded as separate species are recognizable entities from host to host, and if this can be established, to determine the species prevalent in bovines from that part of the country. Altogether, nine groups of coccidial oocysts of the genus *Eimeria* were found, seven of which fitted the descriptions of established species while the other two were previously undescribed.

—C. Horton Smith.

MULLIGAN, H. W., RUSSELL, P. F., & MOHAN, B. N. (1940). **Specific Agglutination of Sporozoites.**—*J. Malar. Inst. India.* **3.** 513–524.

The authors report agglutination of the sporozoites of *Plasmodium gallinaceum*, *P. praecox*, *P. malariae*, and *P. falciparum* in the presence of homologous serum from chronic cases, in dilutions of 1 : 1,000–1 : 16,000, 1 : 8,000–1 : 65,000, 1 : 4,000, and 1 : 8,000 respectively. The highest dilution of normal or heterologous malarial serum which produced sporozoite agglutination was 1 : 128. Serum from a chronic case of human malaria and sera from monkeys with acute and chronic infections with *P. cynomolgi*, *P. knowlesi*, and *P. inui* agglutinated the sporozoites of *P. gallinaceum* in slightly higher dilutions (1 : 64–1 : 128) than the corresponding normal sera (1 : 64–1 : 32).
—B. C. BASU.

SHORTT, H. E. (1940). *Babesia* **sp. in the Indian Leopard,** *Panthera pardus fusca* **(Meyer).**—*Indian J. med. Res.* **28.** 277–278.

A species of *Babesia* was seen in a blood smear from a leopard from Coimbatore (South India). The average size of the ring forms was 1·3μ (extremes 0·8–2·0μ). In the absence of full life-histories, including the identity of the carrier arthropod, S. has refrained from describing it as a new species.—H. N. RAY.

I. OTTOSEN, H. E. (1939). Leptospira-infektioner. **[Leptospira Infection].**—*Maanedsskr. Dyrlaeg.* **51.** 15–22, 46–56 and 68–75.

II. OTTOSEN, H. E. (1939). Forsøg angaaende nogle patogene Leptospira-stammers antigene Struktur. **[Research on the Antigenic Structure of Pathogenic Leptospira].**—*Ibid.* 305–313.

I. O. discusses the literature on the subject and describes his work at the State Serum Laboratory, Copenhagen. Serological and a few cultural and animal-inoculation tests were made from blood or kidney suspension of 583 hospitalized dogs and of 197 dogs brought to the veterinary college for destruction. Of the former, 196 (33·6%) reacted serologically at a titre of 1 : 100 or over with *L. canicola* antigen, 50 (8·6%) with *L. icterohaemorrhagiae* antigen, and 14 (2·4%) with both antigens equally. Of the latter dogs, the corresponding figures were 39 (19·8%), 8 (4·1%), and 8 (4·1%). Tables give the number of reactors at eight titres (1 : 10–1 : 30,000). In about 30 cases the serological tests were repeated after intervals of 1–4 weeks and a few of these cases were tested a third time. It was found that the reactions varied remarkably towards the two antigens, both in intensity and specificity, which showed that a single test with two antigens is not reliable in indicating the species of infecting leptospira. While admitting the need of research on artificially infected dogs, O. considers that a titre of 1 : 100 should be regarded as the criterion of infection.

In the above groups, the ratio of infected males to females was 10 : 1 in the sick dogs and 30 : 13 in the dogs sent for destruction. The greatest numbers of reactors were in the 2–5 year age-groups in both series of dogs.

Spirochaetes were found in the urine of 49 of the 260 reacting hospitalized dogs [evidently only one examination made: as with blood tests, so with urine tests, it is probably necessary to repeat them in order to obtain a reliable result].

Attempts were made to cultivate leptospira from the kidneys of eight of the sick dogs. In one case this succeeded directly and in two more after preliminary inoculation of a g. pig. Direct culture also succeeded with one of the dogs sent for destruction. In every case the isolated strain was of the *L. canicola* type.

Some reports are quoted of leptospirosis in other domestic and in fur animals and new records are given of the finding of leptospira antibodies in the blood of 4 pigs, 1 cat, 45 horses, and 10 rats (8 brown and 2 white). Leptospira were also isolated from a fox.

II. O. describes the method of identifying leptospira strains by the antibody-absorption method. He used it on eight strains including one known *L. icterohaemorrhagiae* strain and the original Dutch *L. canicola* strain, thereby identifying three new Danish *L. canicola* strains isolated from dogs and three new Danish *L. icterohaemorrhagiae* strains, two from dogs and one from a brown rat. More clear-cut results were obtained with the former than with the latter strains, as indicated by the completeness of absorption of antibody. The two species of *Leptospira* were definitely distinct in the tests.—J. E.

KAPUR, H. R. (1940). **Transmission of Fowl Spirochaetosis through Agents Other than** *Argas persicus.*—*Indian J. vet. Sci.* **10.** 354–360.

159 specimens of *Ornithodoros papillipes* and 88 of *O. savignyi*, which had been fed in the third nymphal stage on fowls infected with spirochaetosis, were fed in their fourth and fifth stages on healthy fowls. None of the healthy birds became infected. Ten specimens of *Aëdes albopictus*, fed three days previously on an infected bird, were fed on a healthy bird which also did not become infected. The disease was transmitted by smearing infective material on the presumed unbroken skin of the comb or the breast.—B. C. Basu.

Ray, H. N., & Raghavachari, K. (1941). **A Note on *Encephalitozoon cuniculi* Infection in a Rabbit.**—*Indian J. vet. Sci.* **11.** 38–41.

E. cuniculi is recorded for the first time in India. The kidney was petechiated and enlarged. Impression preparations were stained by the May-Grünwald-Giemsa technique. Detailed morphological studies revealed (1) an early amoeboid stage, (2) multiplication by binary fission or schizogony, and (3) the resisting phase or spore originating from a pansporoblast. A vacuolated area at one end of the spore resembled a polar capsule. A microsporidian affinity was thus suggested, but the authors are reluctant to assign the parasite a systematic position in the group until a more detailed study has been made. Two rabbits were inoculated with an emulsion of infected tissue, one subcutaneously and the other intravenously, but no infection was set up.

—S. C. A. Datta.

Ray, H. N., & Raghavachari, K. (1941). **A Note on *Toxoplasma canis* Infection in a Spaniel.**—*Indian J. vet. Sci.* **11.** 29–32.

The occurrence is described of *T. canis* in a spaniel which died of artificial *Babesia gibsoni* infection. Stained organ smears showed a few *B. gibsoni*, and fairly numerous *T. canis* in various developmental stages. The latter were also seen in liver and spleen sections.

The only method observed of reproduction of *T. canis* was by longitudinal binary fission, and not by schizogony as has been previously described by other workers. In both intra- and extra-cellular parasites, nuclear division was seen and, in a few individuals, two pink-stained dots suggestive of centrosomes were observed at the poles of the dividing nucleus. Marked cellular degeneration in the liver and spleen was noticed.—P. C. Nag.

Manwell, R. D. (1941). **Avian Toxoplasmosis with Invasion of the Erythrocytes.**—*J. Parasit.* **27.** 245–251.

M.'s view [and in the abstractor's opinion, the correct one] is that generic differentiation on the grounds of strong host-specificity, regarded by some as the chief characteristic of a genus, is confusing, as different species in the genus may vary in the degree of host specificity which they exhibit. M. considers it better to base the identification of avian parasites classified as *Toxoplasma* on morphological grounds, than to regard them as something different because transmission to other hosts has not yet been accomplished. A greater knowledge of the group, however, may mean a revision of its taxonomy.

M. reports a toxoplasm infection in a young English sparrow in which there was a large-scale invasion of the erythrocytes, which is interesting since *Toxoplasma* was regarded as typically a parasite of the phagocytic cells. He also observed a process of apparent schizogony. Subinoculation of blood and organ tissues into canaries failed to show any evidence of mixed infection. M. points out that the *Toxoplasma* infections evident in two of these canaries may not have been a case of genuine transfer.

—C. Horton Smith.

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

Cowdry, E. V. (1940). **Identification of Inclusions in Virus Diseases.**—*Amer. J. clin. Path.* **10.** 133–146.

A general discussion on the nature, significance, and methods of recognizing both nuclear and cytoplasmic inclusion bodies. A large number of diseases are reviewed and it is emphasized that the viruses are themselves a very heterogeneous group and that rickettsia and protozoa may also produce inclusion bodies. It follows from this that the nature of the inclusion bodies produced by the various agents also varies greatly.—John Francis.

Stanley, W. M. (1941). **Some Chemical, Medical and Philosophical Aspects of Viruses.**—*Science.* **93.** 145–151.

S. reviews, necessarily in a somewhat theoretical way, fields opened up to research into virus diseases by the discovery that

tobacco mosaic virus is a crystalline nucleo-protein and not a living organism. He describes the characters of this nucleo-protein and its behaviour under certain chemical manipulations, in so far as its ability to reproduce the disease is concerned. The possible origin, nature, and mode of action of disease viruses in general is discussed in the light of this knowledge.—ALEX. THOMSON.

SABIN, A. B., & DUFFY, C. E. (1940). **Nutrition as a Factor in the Development of Constitutional Barriers to Involvement of the Nervous System by Certain Viruses.**—*Science.* **91.** 552–554.

Recent investigations [*V. B.* **11.** 523.] have shown that, with age, animals may develop a resistance to infection of the nervous system by certain viruses, as a result of changes in tissues or structures which the viruses must pass before they can give rise to paralysis or encephalitis. It has been shown that at the age of 14 days, mice are 100% susceptible to the intramuscular injection of vesicular stomatitis virus but are approximately 100% resistant when 35 days old.

The effect of various diets on the development of this resistance has now been studied by two different methods. (a) Female mice were maintained on "adequate diets" throughout pregnancy and for two days after delivery when they were given artificial test diets. The young were weaned when 28 days old and continued to receive the test diet. (b) Females on "adequate diets" were allowed to suckle their young for 14 days; the young were then weaned and fed on artificial diets. The results are of a preliminary nature, but they are claimed to indicate that deficiency of vitamin B_1, riboflavin, or vitamin E, as well as underfeeding, retards the development of a "constitutional barrier" to involvement of the nervous system by vesicular stomatitis virus.—J. F.

*NAI, D. D. (1940). **[Histopathology of Complications of Foot and Mouth Disease. II. Changes in the Organs of Internal Secretion].**—*Clin. vet. Milano.* **63.** 205–219. [Abst. from abst. in *Wien. tierärztl. Mschr.* **28.** 47]. [For part I, see *V. B.* **7.** 628].

N. studied the histology of the endocrine glands of 35 cows which had recovered from, and of nine cows which had died of, F. & M. disease. It was found that a lesion could be demonstrated in the pituitary gland of every animal whether affected or not with hypertrichosis [see part I]. It consisted of numerous foci of infiltration of small lymphocyte-like cells surrounding the blood vessels of the anterior part (less numerous in the intermediate and posterior parts). The lesion was often accompanied by sclerosis of the stroma and by a reduction of the glandular tissue; the latter change could be seen macroscopically in chronic cases such as occur occasionally when skeletal muscle or heart muscle lesions develop [see *V. B.* **11.** 89 and 512]. Similar changes were observed in the adrenal glands, with thickening of the interstitial and capsular connective tissue and the presence of lymphocyte-like cells in the medulla, but not in the cortex.

It was not possible to relate these endocrine gland lesions to any clinical characteristic of F. & M. disease.

Of other glands examined, the pancreas showed the same changes, but not the ovaries, thymus, pineal, thyroid, or parathyroids.

N. suggests a connexion between the pituitary lesion and hypertrichosis and the fall in milk yield.—J. E.

ANON. (1941). Fall av mul- och klövsjuka. **[An Outbreak of Foot and Mouth Disease in Sheep].**—*Skand. VetTidskr.* **31.** 55.

A brief note referring to an outbreak of F. & M. disease in sheep placed in a sheep stall which had been vacant for nine months after occupation for a short time by infected cattle. The floor could not be properly disinfected [presumably it was earth]. It is inferred that no infection had come in from outside the area, and, therefore, that infection had persisted for nine months.—J. E.

PETERSEN, G. (1940). Mund- og Klovesyge-Vaccinen og dens Betydning for Bekaempelsen af Mund- og Klovesygen. **[The Use of Vaccine in the Control of Foot and Mouth Disease].**—*Svensk Vet-Tidskr.* **45.** 177–182, 217–234 and 254–268.

This is a general and detailed review of the development and use of F. & M. disease virus-adsorbate vaccine in Europe, up to about the end of 1939, when the great epizootic which started in 1937 died out.

WILLSTÄTTER'S researches on adsorbing substances showed the adsorbent value of alumin-

ium hydroxide for enzymes, and SCHMIDT of the State Serum Laboratory, Copenhagen, demonstrated its value for the adsorption of diphtheria and other toxins, and later of fowl-plague virus and of F. & M. disease virus (1934). In the next few years Danish research workers produced an F. & M. disease adsorbate vaccine which proved to be effective for immunizing g. pigs, the necessary attenuation of virus being obtained by incubation at 37°C. for 48 hours. Meanwhile WALDMANN *et al.* at the German research station on the isle of Riems had taken up the study of F. & M. disease adsorbate vaccine and by 1938 were able to announce the production of an effective vaccine for cattle. The vaccine was formolized as well as incubated at 25°C. for 48 hours to obtain the necessary attenuation.

Before Denmark became infected at the end of 1938, arrangements were made to produce vaccine for Danish cattle on a large scale. This was done by co-operation between the F. & M. disease research station on the isle of Lindholm and the Serum Laboratory at Copenhagen, the latter institute preparing the vaccine from virus sent from Lindholm. By the end of 1938, 74,535 cattle in 4,170 herds had been vaccinated. The more valuable breeding herds were immunized first because the disease was rapidly spreading and there was no time to conduct a block vaccination scheme. This original outbreak which was due to O type virus began to decline after January, 1939, and later in the year a fresh outbreak due to A type virus appeared. This necessitated the preparation of A type and of bivalent A–O type vaccine, the latter for cattle which had escaped the first outbreak. These were used partly in large single doses (60 c.c. for adult cattle) and partly in " fractionated " doses (two doses of 15 c.c. at 14 days' interval) until a total of 385,600 cattle in 22,646 herds had been vaccinated (about one-tenth of the total of Denmark's cattle). The results of vaccination were definitely good, as only a very small percentage of vaccinated cattle contracted the disease, while most of the non-vaccinated cattle in threatened areas became infected. [See also *V. B.* **10.** 666.]

The rare harmful effects of vaccination are reviewed; vaccinated cattle occasionally showed temporary ill-health or developed a large lump at the injection site.

The various methods of using vaccine in an epizootic vary with the terrain, rate of spread and virulence of the virus, etc. It is suggested that control in the future should be by international organization and that vaccine should be available on an adequate scale to meet an epizootic.

It is concluded that the adsorbate vaccine is definitely effective and reliable and can play an important part in checking future epizootics.

—J. E.

*HOLM, P., SCHMIDT, S., & STEENBERG, E. (1941). Infektion og Vaccination af Marsvin med Mund- og Klovesygesmitstof, indeholdende mere end een Virustype. [**Infection and Vaccination of G. Pigs with Foot and Mouth Disease Virus of Mixed Type**].—*Maanedsskr. Dyrlaeg.* **52.** 587. [Abst. from abst. in *Skand. VetTidskr.* **31.** 163].

The authors found in two independent experiments that g. pigs infected by, and immune against, type A virus, believed to be pure, also became immune against type O virus.

It is suggested that the alleged type A virus used may have contained some type O virus at source [the *försöksstation*—presumably the F. & M. disease research station at Lindholm].

ENDREJAT, E. (1940). Die Rinderpest im West-Iran. [**Rinderpest in Western Iran**].—*Tierärztl. Rdsch.* **46.** 111–113.

In 1936, rinderpest was not present in Western Iran, but it appeared in 1937 in ten localities. 6,365 cattle were vaccinated by Curasson's wet or dry vaccine [see DELPY—*V. B.* **6.** 328 and 509, and **7.** 595]. Bovine malignant catarrh may be confused with rinderpest and the differential diagnosis of these two diseases is discussed.—JOHN FRANCIS.

*—. (1941). **Symposium on Rinderpest Control in India.**—*Indian vet. J.* **17.** 201–258.

This is a compilation of information from 14 Provincial and Indian States' veterinary departments. Old as well as modern methods are described.

In Assam, passive immunization with serum was the mainstay in the earlier days; serum-virus inoculation was used later, but now goat-tissue vaccine is extensively employed for prophylaxis and in actual outbreaks. Severe reactions are controlled by giving 20–50 c.c. serum. In Baluchistan rinderpest is reported to be rare. The incidence of the disease in

Baroda State is comparatively low: in buffaloes the mortality exceeds 70% and in cattle it is 30–40%. Until 1937 serum-alone immunization was used but this has since been replaced by goat-virus inoculation. In Bihar and Orissa, goat-tissue vaccine is now extensively employed. A dose of serum is given with goat-tissue vaccine to check undesirable reactions. In Gwalior State goat-tissue vaccine has been in use since 1938. In Hyderabad waves of rinderpest mortality reach their peak every ten years. The State has a goat-virus-producing centre of its own. In Jodhpur State, goat (blood) virus alone is generally employed both in actual outbreaks and for prophylaxis. In Madras the disease occurs in waves. Considerable losses have been prevented by the intensive protective measures adopted. Serum and vaccines are prepared in the Presidency. A resumé is given of the work done at the Imperial Veterinary Research Institute, Mukteswar. In Mysore State goat-blood virus is now generally used. In the North-West Frontier Province most affected animals are slaughtered for food. Goat-tissue virus is used with satisfactory results as a prophylactic and in actual outbreaks. Hill cattle and buffaloes are given serum as well. Rinderpest is endemic in the Punjab where an active campaign using goat virus to check the disease has been established. Immunity in calves so vaccinated under the age of 8–9 months is liable to break down. A station to produce goat-tissue virus was opened in Sind in 1935. The disease has taken a heavy toll among cattle populations of the Central Provinces and Berar. It is reported that 2,350,000 cattle died between 1925 and 1939. A local (bovine) strain of virus was found to be quite safe for cattle after 40 passages and for buffaloes after 80 passages through goats. Animals vaccinated with goat-blood virus were found to be immune when tested after 3½ years.

—J. A. IDNANI.

CORNELL, R. L., & OONYWONGSE, R. (1941). **Observations on Rinderpest Immunisation with Goat Virus.**—*Indian J. vet. Sci.* **11.** 1–15.

The authors describe virulence tests with goat virus, originally obtained from Mukteswar, on cattle and buffaloes from different parts of Thailand. The virus was safe for cattle, but about 50% of buffaloes immunized under field conditions died. In a field trial on 2,870 cattle two died and there were 14 severe reactions. Active virus was demonstrated in the blood 5–15 days after injection. Virus was present in the nasal secretions of vaccinated calves.

—J. A. IDNANI.

SRINIVASAN, V. (1940). **Active Immunisation of Camels against Rinderpest with Goat Blood Virus.**—*Indian vet. J.* **16.** 259–260.

Symptoms in two camels are described. Twenty camels were successfully immunized with 1·0 c.c. goat-blood virus during an outbreak.—J. A. IDNANI.

MOHLER, J. R. (1941). **Brief History of Infectious Equine Encephalomyelitis and Related Affections in the United States.** —*J. Amer. vet. med. Ass.* **98.** 451–453.

A concise history of infectious E.E. and related diseases is given. The period covered ranges from 1847 to 1941.—D. D. OGILVIE.

KENSLER, G. T. (1939). **Studies on the Immunology of Toxic Substances Produced by Streptococci Isolated from Equine Encephalomyelitis.**—*J. Amer. vet. med. Ass.* **95.** 730–733. [See also ROSENOW *et al.*—*V. B.* **8.** 769].

When grown in certain media, some strains of streptococci isolated from the brains of horses dying from E.E. have been shown to produce toxic filtrates, as judged by their effect on mice and on chick embryos. There was no constant relationship between the toxigenicity and pathogenicity of the strains. The addition of "a streptococcic equine encephalomyelitis immune horse serum" to streptococcal filtrates prevented toxic manifestations in the mice and chick embryos. It is also claimed that mice immunized with formolized streptococcal filtrates and, to a less extent, with formolized streptococci, developed a definite immunity to the subsequent intracranial inoculation of Western type E.E. virus. [No details are given concerning the biochemical or serological properties of the streptococci used in this work.]—JOHN FRANCIS.

BEAUDETTE, F. R., BLACK, J. J., & HUDSON, C. B. (1941). **Another Case of Equine Encephalomyelitis in New Jersey Pheasants.**—*J. Amer. vet. med. Ass.* **98.** 449–450.

A further case of E.E. in pheasants is reported, confined to one lot of 218 birds, the mortality being 68%. The outbreak occurred in Atlantic county in an area in which the dis-

ease appears in horses. Birds in contact pens were not affected. The origin of the outbreak was obscure. [See also *V. B.* **11.** 90.]

—D. D. OGILVIE.

BAUMANN, R. (1940). Ueber die Ausbreitung der ansteckenden Blutarmut der Pferde in der Ostmark. [**Incidence of Equine Infectious Anaemia in Austria**].—*Wien. tierärztl. Mschr.* **27.** 33–37.

Since 1932, B. has carried out diagnostic work on material sent under suspicion of E.I.A. in Austria. He gives a map showing the 11 localities where he has confirmed its existence, nearly all being in the extreme east. Diagnosis is based on the histological changes in the liver, kidney, spleen, and heart muscle. These are described and reproduced photographically.—H. H. SKINNER.

STECK, W. (1939). Studien über die infektiöse Anämie der Pferde. II. Thermolabilität des Serums. [**Studies on Equine Infectious Anaemia. II. Thermolability of the Serum**].—*Schweiz. Arch. Tierheilk.* **81.** 531–547. [For part I, see *V. B.* **9.** 87].

Samples of blood were collected from 11 cases of E.I.A. in horses and from 62 controls, comprising normal horses and horses affected with various other febrile and non-febrile conditions. The percentage volume of the erythrocytes and leucocytes in each sample was determined, and an estimation made of the degree of flocculation of the serum proteins which occurred when the serum was diluted with its own volume of saline and then heated to 75°C. for 3 min. The degree of flocculation was marked in the case of eight (75%) of the horses infected with E.I.A. A similar degree of flocculation was observed in the case of only 16 (25%) of the other horses. Flocculation did not appear to be correlated with any other factor (degree of anaemia, body temperature, etc.).

The diagnostic value of this observation and the possibility of its being due to the presence of the virus in the blood are to be further investigated.—H. H. SKINNER.

I. GEIGER, W. (1939). Zum gegenwärtigen Schweinepestseuchengang. [**The Current Swine Fever Epizootic**].—*Dtsch. tierärztl. Wschr.* **47.** 601–604.

II. RÖHRER, H. (1939). Zur histologischen Diagnose der akuten Schweinepest. Bemerkungen zu dem Artikel "Zum gegenwärtigen Schweinepestseuchengang" von Dr. habil. Geiger. [**Histological Diagnosis of Acute Swine Fever. Comment on Article by Geiger (see I)**]. —*Ibid.* 733–734.

III. GEIGER, W. (1939). Zur histologischen Diagnose der akuten Schweinepest. Zu dem gleichnamigen Artikel von H. Röhrer. [**Histological Diagnosis of Acute Swine Fever. Reply to Comment by Röhrer (see II)**].—*Ibid.* 735.

I. After being relatively rare in Germany for ten years, S.F. flared up considerably in north-west Germany in June, 1939. G. comments on this and discusses the possible means of spread, and methods of diagnosis and control.

In Germany it is almost impossible, owing to government regulations, for S.F. to be spread by virus-contaminated swine erysipelas antiserum, which is used every year on a large scale. It may be spread, however, by carelessness—if a pig being immunized against S.F. contains the virus, the serum injection needle may be infected and may contaminate the unused serum about to be injected into other pigs. S.F. virus excreted on a farm premises is easily conveyed by persons and objects.

The difficulty is admitted of differentiating acute early S.F. The finding of small haemorrhages in internal organs, particularly in the kidneys, bladder mucosa, and terminal colon, of swollen and dark-red marbled lymph nodes and of infarcts at the edges of the unswollen spleen will give strong grounds for a positive diagnosis.

Regarding control, immune serum is not used alone in newly infected herds; serum-virus immunization is used. The Eystrup S.F. research institute prepares antiserum and virus, but only issues them to newly infected herds when the S.F. diagnosis has been confirmed by one of its staff. Good results are claimed in these circumstances. The one potential disadvantage of the method is that newly immunized pigs excrete the virus, though only for a few days unless the reaction is very severe and recovery slow. Three instances of the successful checking of S.F. in newly infected herds by serum-virus inoculation are given.

II. R. complains that G. in his article has overlooked the histological method of diagnosis from lymph node and brain material. Although the characteristic changes occur also in swine

paratyphoid [see SÁLYI—*V. B.* **5.** 556.], the latter is very rare in Germany, so confusion on that ground does not arise. The change in the l.nn. in acute S.F. is a hyaline degeneration of the capillaries and in the brain an encephalitis, which lesions tend to confirm a provisional diagnosis of S.F., when supported by other evidence.

III. G. admits the value of histological diagnosis, while reminding the reader that it is only a supplementary method.—J. E.

RUBINO, M. C., & TORTORELLA, A. (1938). Informe sobre la preparación de una vacuna contra la peste porcina. Nota preliminar. **[The Preparation of a Vaccine against Swine Fever. I].**—*Bol. mens. Direcc. Ganad., Montevideo.* **22.** 352–366.

RUBINO, M. C., & TORTORELLA, A. (1940). Vacuna al cristal violeta contra la peste porcina. 2. Informe de los trabajos realizados en la Sección Laboratorio de Biología Animal de la Direccion de Ganaderia. **[Report of Work on Crystal-Violet Vaccine against Swine Fever. II].** —*Ibid.* **24.** 396-407.

I. A report of a series of trials with a crystal-violet vaccine against S.F. The vaccine proved safe and immunity was conferred, but the duration of immunity had not then been verified.

II. The vaccine used was prepared from 80 c.c. infected defibrinated blood, 10 c.c. of a 3% solution of dibasic sodium phosphate, and 10 c.c. of a 3% aqueous solution of crystal violet. It was incubated at 37°C. for 14 days and preserved in the refrigerator.

The authors found that the vaccine was harmless in doses of 5–10 c.c. Control animals kept in contact with inoculated swine showed no signs of illness, and at later tests were found to be susceptible to infection with S.F. virus. The vaccine produced a solid immunity lasting 12 months. Vaccines kept for 6–12 months produced immunity which lasted for at least six months.

The crystal violet did not stain tissues except at the site of inoculation and even this stain disappeared in a short period.—M. WATSON.

I. JOHNSON, H. N., & LEACH, C. N. (1940). **Canine Rabies Vaccination. An Experimental Study of the Efficacy of the Single Intraperitoneal Injection Method with Phenol-Treated Vaccine.**—*Amer. J. Hyg.* Sect. B. **32.** 69–73.

II. LEACH, C. N., & JOHNSON, H. N. (1940). **Canine Rabies Vaccination. An Experimental Study of the Efficacy of the Single Subcutaneous Injection Method with Chloroform-Treated Vaccine.**—*Ibid.* 74–79.

I. A comparison was made between the antigenic effects of a single 5 c.c. intraperitoneal injection of canine rabies vaccine and a similar dose given subcutaneously. Bilateral intramuscular injection of "street" virus into the masseter muscles was used as the test inoculation.

Fifty-two dogs were vaccinated intraperitoneally and injected after one month with "street" virus. Of these, 36·5% succumbed to rabies. 54% of 63 controls also died.

105 dogs were vaccinated subcutaneously, and 24·8% succumbed to infection. 54% of 120 controls also died.

The authors therefore consider that there is no advantage in substituting the intraperitoneal for the subcutaneous method of vaccination.

II. In an experiment parallel to that described in I, 50 dogs were vaccinated by a single subcutaneous injection of 5 c.c. of a commercial chloroform-treated rabies vaccine and tested after one month by intramuscular injection of "street" virus. 40% of the animals died of rabies compared with 61·8% of 55 controls.

It is concluded that, under similar conditions, chloroform-treated vaccine affords considerably greater protection than phenol vaccine.

—D. D. OGILVIE.

VEERARAGHAVAN, N., & PHILIPSZ, G. L. C. (1940). **The Susceptibility of Domestic Fowls to a Strain of Rabies Virus Obtained from a Jackal.**—*Indian J. med. Res.* **28.** 81–90.

Twenty-nine serial intracerebral passages were made in fowls of a "street" rabies virus obtained from a jackal. The fowls were highly susceptible and after the 15th passage the virus became "fixed". The incubation period on first inoculation was 29 days and this was gradually reduced to two days when the virus was "fixed". The duration of illness fell from four days to 24 hours or less in the first four

passages. Numerous Negri bodies were present in the earlier passages, but later they were fewer and smaller. Rabbits or g. pigs were used as controls for each passage. G. pigs inoculated from the earlier passages showed comparatively long and irregular incubation periods and developed furious rabies, while those from later passages developed the disease in 2–3 days and died of dumb rabies. The findings in rabbits were similar. Subinoculation from rabbit to rabbit extended the incubation period. Pigeons appeared even more susceptible than fowls, but sparrows were relatively resistant.—J. R. HADDOW.

GLÄSSER. (1939). Zum Schweinegrippeproblem. [**Swine Influenza**].—*Dtsch. tierärztl. Wschr.* **47.** 209–212.

G. records his opinions after 35 years' experience in Hanover, during which time the disease has not altered substantially in type. He prefers the term *Schweinegrippe* to *Ferkelgrippe*, since the disease is not confined to piglets but affects weaners and "stores" also, although less acutely. There has been a slight decrease in the incidence of swine influenza since the war of 1914–18, due almost entirely to a reduction in the number of large herds. The disease is rare in small herds, and on the medium-sized and larger farms there is a marked seasonal incidence.

Methods of combating the disease are discussed. G. concludes that husbandry plays a greater role than the infection itself. The disease appears spontaneously whenever conditions predispose to it, and it may then be passed on to other pigs; the infective agent is likely to persist wherever pigs are kept, and ordinary veterinary police measures are of no value. Good stock, dry and warm houses, fresh air, and plenty of bedding are advocated. On small farms these conditions may readily be obtained, and on large farms, which should face south, the sows should be moved into Waldmann huts before farrowing, and kept there until the piglets are two months old. The fattening houses must not be overcrowded. Complete elimination of the disease is unlikely, but if these precautions were adopted a very substantial decrease in its incidence might be achieved.

G. believes that his observations are applicable to north-west Germany as a whole.

—ALASTAIR N. WORDEN.

I. BURNET, F. M. (1940). **Influenza Virus Infections of the Chick Embryo by the Amniotic Route. I. General Character of the Infections.**—*Aust. J. exp. Biol. med. Sci.* **18.** 353–360.

II. BURNET, F. M., & FOLEY, M. (1941). **Two Methods for the Detection of Influenza Virus in Human Throat Washings without the Use of Ferrets.** —*Med. J. Aust.* Jan. 18th. 68–72.

I. B. recently described [*V. B.* **11.** 522.] a method of inoculation by which easily recognizable influenzal infections can be produced in the lung of the chick embryo, the inoculum being delivered into the amniotic cavity. Further details are now given concerning symptoms and lesions produced and the distribution of virus in the embryo. Thirteen strains of influenza virus have been shown to produce lesions by this technique, only one strain, a fully adapted "egg" strain, failing to do so. B. concludes that the virus can probably be isolated directly from human throat washings by this method. A footnote postscript records that these expectations have already been fulfilled.

II. The first of these two methods for detecting influenza virus in human throat washings is that outlined in the foregoing abstract. It was found to be more effective than ferret inoculation. The second method involves inoculation of mice intranasally with the throat washings. Subsequently these mice are (a) bled and the serum tested for antibodies against various strains of influenza, and (b) inoculated with known virus to test for immunity. If influenza virus is present in the throat washings, the mice will be found to have been immunized, and the immunological character of the virus will be disclosed by tests on the serum taken previously. The virus is not actually isolated in this second method.

—W. I. B. BEVERIDGE.

SALK, J. E., LAVIN, G. I., & FRANCIS, T., Jr. (1940). **The Antigenic Potency of Epidemic Influenza Virus Following Inactivation by Ultra-violet Radiation.** —*J. exp. Med.* **72.** 729–745.

Two strains of epidemic influenza virus (PR.8 and Melbourne) maintained by mouse passage or in tissue-culture media, were irradiated by exposure to the full light of a quartz mercury-vapour lamp, suspensions being made up in phosphate buffer. The infectivity

of both strains was destroyed. The time required to inactivate Melbourne virus using a 1% mouse-lung suspension, was 6 min. and a tissue culture required 31 min.; the corresponding periods for PR.8 were 8 min. and 22 min. respectively. The periods of exposure for inactivation of more concentrated suspensions (5 and 10%) were proportionately larger.

Provided that the time of irradiation was restricted to that necessary to inactivate the virus, the antigenic power of treated suspensions remained high: nevertheless, the comparison of active and inactive suspensions showed that the latter were nearly 100 times less potent, but were more effective than corresponding suspensions treated with formalin. Mice vaccinated with 400,000 M.L.U. (minimal lethal units) of irradiated PR.8 resisted 100,000 M.L.D. given intranasally, whereas a similar degree of immunity was induced by 10,000 M.L.D. of infective virus: similarly, 40,000 M.L.U. of inactive virus protected against 10,000 M.L.D., corresponding with 400 M.L.D. of active virus.

The advantage of grading vaccines in terms of the minimum number of M.L.U. required to induce complete immunity against a maximum number of M.L.D. is stressed as providing a standard method of evaluation.—R. E. G.

FRANCIS, T., Jr., & MOORE, A. E. (1940). **A Study of the Neurotropic Tendency in Strains of the Virus of Epidemic Influenza.**—*J. exp. Med.* **72.** 717–728.

The observation of STUART-HARRIS that the WS strain of epidemic influenza A after passage through chick-embryo brains can be trained to neurotropism in the central nervous system of the mouse has been confirmed. Adaptation to the mouse brain has also been observed without preceding transference in brain-culture medium, as WS virus in ordinary tissue culture became pathogenic after a number of serial intracerebral inoculations. Neurotropic activity did not develop at the expense of the pneumotropic invasiveness; moreover, serum neutralization and vaccination experiments in mice showed that the neurotropic and pneumotropic WS strains were identical. They differed from the viruses of meningo-pneumonitis and choriomeningitis.

In contrast to WS strains, PR.8 and other human viruses together with swine strains failed to establish themselves in the mouse C.N.S., while the Melbourne strain behaved in an intermediate fashion. Available evidence suggests that the capacity of the WS and Melbourne strains to infect the C.N.S. represents an enhancement of a basic characteristic which is absent from other strains.—R. E. G.

DETTWILER, H. A., HUDSON, N. P., & WOOLPERT, O. C. (1940). **The Comparative Susceptibility of Fetal and Postnatal Guinea Pigs to the Virus of Epidemic Influenza.**—*J. exp. Med.* **72.** 623–634.

Studies were undertaken in foetal and newly born g. pigs to determine the nature of their higher susceptibility to influenza virus than mature animals. PR.8 virus was prepared from mouse lung and, after filtration, was inoculated intracerebrally into adult and newly born g. pigs, and also into foetuses by injection through the abdominal wall of the mother.

The virus readily established itself in the foetal brain, lung, liver, and kidney, reaching its maximum concentration at the sixth day and disappearing from all sites by the tenth day. The virus was carried to the sixth generation but thenceforward there was a reduction in potency and spread of the virus. In newly born g. pigs, on the other hand, the virus was unable to propagate in the brain following intracerebral inoculation, but the intranasal route resulted in its wide distribution in many organs from which it was recovered over a period of 2–9 days.

The observation of STUART HARRIS [*V. B.* **8.** 513.] on the existence of an inapparent form of the disease in mature g. pigs was confirmed. —R. E. GLOVER.

HENLE, W., STOKES, J., Jr., & SHAW, D. R. (1941). **Passive Immunization of Mice against Human Influenza Virus by the Intranasal Route.**—*J. Immunol.* **40.** 201–212.

Experiments on passive immunity against PR.8 virus were undertaken in mice. It was found that relatively small amounts of serum given intranasally were just as effective as larger doses injected by the intravenous and intraperitoneal routes, provided that the amount of virus used in the tests was not excessive. The duration of the protection afforded by serum given intranasally was relatively short. Mouse, ferret, horse, rabbit, and human sera were found to be equally effective.

A potent serum gave complete immunity against 100 M.L.D. of virus and retarded the

development of lesions induced by 100,000 M.L.D.

The results of other workers were confirmed, that lesions could be prevented or greatly diminished if serum was given up to 24 hours after infection with virus but not after this period.—R. E. GLOVER.

FREEMAN, M., DERRICK, E. H., BROWN, H. E., SMITH, D. J. W., & JOHNSON, D. W. (1940). **Studies in the Epidemiology of Q Fever. 5. Surveys of Human and Animal Sera for *Rickettsia burneti* Agglutinins.**—*Aust. J. exp. Biol. med. Sci.* **18.** 198–200. [For previous parts, see *V. B.* **11.** 758].

DERRICK, E. H., SMITH, D. J. W., & BROWN, H. E. (1940). **Studies in the Epidemiology of Q Fever. 6. The Susceptibility of Various Animals.**—*Aust. J. exp. Biol. med. Sci.* **18.** 409–418.

5. Wild animals were captured and their sera tested for agglutinins for *R. burneti*, the cause of "Q" fever in man. Thirty-nine of 180 sera from bandicoots gave positive reactions as did also several sera from rats of different species. Sera from 105 cattle were tested and one was found to be positive. The owner of the positively reacting cow had himself been affected with "Q" fever. Eighteen of 79 human sera from abattoir workers and six from 64 forestry workers were positive; on the other hand, there were no positive reactors among 186 soldiers camped in an area where bandicoots were heavily infected.

6. The rickettsia causing this disease in man were inoculated into nine species of wild animals (seven rodents and two marsupials). All proved susceptible but the infections were mild and often inapparent. The g. pig, rabbit, and bandicoot are also susceptible. The potential host range of *R. burneti* is therefore wide and it is likely that several of these animals provide natural reservoirs of the infection.—W. I. B. BEVERIDGE.

PEARSON, H. E., & EATON, M. D. (1940). **A Virus Pneumonia of Syrian Hamsters.**—*Proc. Soc. exp. Biol., N.Y.* **45.** 677–679.

Whilst attempting to infect hamsters (*Cricetus auratus*) with influenza A virus, another filtrable agent capable of producing pneumonia in these animals was found and carried through 17 intranasal passages. A Berkefeld V filtrate of lung-turbinate suspension was infective for hamsters but not for mice, although unfiltered lung or nasal mucosa was infective for mice as well as hamsters. Hamsters died 6–15 days after intranasal inoculation; the lungs of dead animals were usually plum coloured and completely consolidated. Subcutaneous, intracerebral, or intra-abdominal inoculation did not produce infection, but the inoculated animals were immune to intranasal inoculation 3–5 weeks later.

The hamster virus was antigenically related to a strain of mouse pneumonia virus, but differed from influenza virus. The possibility that a "pleuro-pneumonia-like" organism is concerned in the production of hamster pneumonia is not completely excluded.—J. F.

HOAGLAND, C. L., WARD, S. M., SMADEL, J. E., & RIVERS, T. M. (1940). **Constituents of Elementary Bodies of Vaccinia. III. The Effect of Purified Enzymes on Elementary Bodies of Vaccinia.**—*J. exp. Med.* **72.** 685–696. [For previous parts, see *V. B.* **11.** 604].

It has become clear that the true effect of enzymes on viruses can be learned only by the use of highly purified or crystalline preparations of these substances and, if possible, equally pure viruses.

In these experiments 10 mg. of purified vaccine virus were suspended in 5 c.c. of phosphate buffer and an equal volume of the enzyme solution added. The mixtures were incubated at 38°C. and examined at intervals. Trypsin, chymotrypsin, and carboxypeptidase alone or in combination had no effect on live or dead vaccine particles as judged by infectivity tests, staining reactions, and amino-acid release. Pepsin at pH 2 did cause hydrolysis of the dead virus, but ribonuclease had no effect on the live virus.

Purified papain, a vegetable enzyme, did cause marked amino-acid release, loss of infectivity, and staining reaction. When once hydrolysis by papain has begun, degradation by trypsin, chymotrypsin, and carboxypeptidase proceeds in an orderly fashion. This appears to indicate that resistance of the virus to pancreatic enzymes is a function of the structure of the E.B. as a whole, rather than being due to any deep-seated peculiarities in the structure of the finer units which make up the virus protein.

Ficin, a potent proteolytic enzyme belonging

to the general class of vegetable papains, and cathepsin, a proteinase occurring in animal cells in many respects analogous to the plant papains, had no effect on vaccine virus.—J. F.

BEAUDETTE, F. R., & HUDSON, C. B. (1941). **Egg Propagation of Turkey Pox Virus.** —*Poult. Sci.* **20.** 79–82.

Experiments are reported on the immunological relationship of a strain of turkey-pox virus to the viruses of canary, pigeon, and fowl pox. 181 chickens were divided into four groups and vaccinated respectively with canary, pigeon, fowl, and turkey pox. Thirty-three days later each group was further divided into four groups and revaccinated with the four viruses.

The canary virus immunized against itself and to a high degree against pigeon virus, but produced slight immunity to fowl virus and none against turkey virus. The pigeon virus protected against itself and against canary virus, but did not give complete protection against turkey and fowl viruses. Turkey and fowl viruses gave almost complete protection against the four viruses used.

The strain of turkey-pox virus used produced in chickens a more severe local and systemic reaction with a percentage of secondary head lesions than did the fowl-pox virus.—F. D. A.

BRANDLY, C. A., GRAHAM, R., & MORRILL, C. C. (1941). **Studies on Certain Filtrable Viruses. III. Longevity of Chorio-allantoic and Comb-Tissue Fowl-Pox Virus in Vitro.**—*Amer. J. vet. Res.* **2.** 190–192. [For previous parts, see *V. B.* **10.** 930].

Experiments to ascertain the influence of temperature, desiccation, and partial vacuum on the duration of viability of chorio-allantoic and comb-lesion fowl-pox virus are described. Desiccation *in vacuo* at room temperature lengthens the virus survival time when it is stored at 0°–4°C. as compared with a similar process without vacuum. There is, however, no advantage in storing *in vacuo* over storing at atmospheric pressure, nor in dehydration at the sublimation temperature of "dry ice" over dehydration at room temperature. In four instances the longevity of comb-tissue virus was greater than that of chorio-allantoic virus; in one instance the reverse was true. Under the most favourable conditions both types of virus were still viable after storage for 24 months. —D. D. OGILVIE.

IYER, S. G., & DOBSON, N. (1941). **A Report on Immunisation Experiments against Newcastle Disease using Crystal Violet Vaccine.**—*Vet. Rec.* **53.** 381–383.

Using egg-cultivated virus after 12–23 passages through developing chick embryos, the authors prepared six different batches of crystal-violet vaccine, but in all cases the results were irregular and unsatisfactory. In all, 51 fowls died from an immunity test dose given subcutaneously or after exposure to natural infection.—GWILYM O. DAVIES.

HOFFSTADT, R. E., & PILCHER, K. S. (1939). **Immunological Reactions of Elementary Bodies and of Virus Free Filtrates from Myxoma Infected Chick Membranes with Hyperimmune Rabbit Serum.**—*J. infect. Dis.* **65.** 103–112. [Authors' summary amended].

Elementary bodies of myxomatosum virus similar to those found in rabbit tissue were found in the chorio-allantoic membranes of infected developing chick embryos.

The soluble antigen associated with myxomatosum virus in tissues of the infected rabbits was found in the infected chorio-allantoic membrane of chick embryos after prolonged serial passage. The results of agglutination tests suggest the possibility of an antigen alteration of the chick-passaged virus.

HOFFSTADT, R. E., OMUNDSON, D. V., & DONALDSON, P. (1941). **Cultivation of the Virus of Infectious Myxoma on the Chorio-Allantoic Membrane of the Developing Duck Embryo.**—*J. infect. Dis.* **68.** 213–219.

HIMMELWEIT [*V. B.* **11.** 95.] easily adapted the viruses of infectious ectromelia and vaccinia to duck eggs. The eggs used in the experiments here reported were all of the Muscovy strain which have an incubation period of 15 days.

The infectious myxoma virus direct from the rabbit did not produce macroscopic lesions, but a strain adapted to growth in chick embryos gave rise to typical lesions in the developing duck egg. The maximum effects were observed in 12-day embryos which had been chilled, prior to inoculation, for 30 hours at 22°C. followed by 24 hours at 35°C. The virus was carried through 20 serial passages. HOFFSTADT & PILCHER [see preceding abst.] showed that chick-passage virus differs serologically from the rabbit virus. Whether the duck-passage

virus is a further modification has yet to be determined.—J. S. PATERSON.

I. HOFFSTADT, R. E., & OMUNDSON, D. V. (1941). **Study of the Living Virus of Infectious Myxoma of Rabbits by High Power Microscopy.**—*J. infect. Dis.* **68.** 207–212.

II. PARKER, R. F., & BRONSON, L. H. (1941). **Neutralization of Virus of Myxoma by Specific Immune Serum.**—*J. Immunol.* **40.** 147–152.

I. Using the technique elaborated by HIMMELWEIT [*V. B.* **11.** 95.] for the study of the viruses of vaccinia and ectromelia on the developing chorio-allantoic membrane of duck embryos, the authors observed that pathological changes could be detected in the chorio-allantoic membrane of the developing chick embryo within 12 hours of inoculation with the virus of infectious myxomatosis. A preliminary inflammation was followed by polymorphonuclear infiltration which impaired the circulation and gave rise to a large necrotic area in the region of infection. The epithelial cells themselves first became granular and cloudy. Later dense plaques became apparent, and finally the nucleus became involved and the whole cell necrosed. In these respects the reactions with myxoma virus more closely resemble those of ectromelia and psittacosis than that of vaccinia.

II. The authors followed up the observations of Thompson [*V. B.* **9.** 162.] who reported that if animals inoculated with myxoma virus are subjected to a high environmental temperature, recovery takes place in a reasonable number of instances. Serum was obtained from two convalescent animals similarly treated and the virus used was in the form of washed elementary bodies suspended in 50% glycerin at pH 7·0. Viral suspensions and virus-serum mixtures were titrated by inoculating a standard volume (0·25 ml.) intracutaneously. Two different experiments were carried out. The first indicated that, whilst convalescent serum could neutralize the infective capacity of the virus, only a fixed proportion of the total virus was inactivated. The second experiment demonstrated that on dilution the potency of the immune serum diminishes regularly.—J. S. PATERSON.

HOFFSTADT, R. E., & PILCHER, K. S. (1941). **A Study of the IA and OA Strains of the Shope Fibroma Virus with Special Reference to the Berry Transformation.**—*J. infect. Dis.* **68.** 67–72.

Both strains of virus survived from 8–15 days during serial passage on chorio-allantoic membranes. Titration of the viruses at each transfer indicated that the infectious agents were decreasing in strength. At either the third or fourth passage no virus could be detected. No lesions were noted on the membranes nor was virus demonstrated at any time in the organs of the embryo. It is therefore assumed that the Shope fibroma virus is not pathogenic for the developing egg.

BERRY & DEDRICK [*V. B.* **6.** 715.] demonstrated that the simultaneous inoculation in rabbits of Shope fibroma virus and inactivated (heat-killed) myxomatosis virus will result in a certain number of positive cases of myxomatosis. This transformation has been confirmed by HURST [*V. B.* **7.** 605.], but not by HYDE [*V. B.* **7.** 180.] nor MECK & ACREE (1939).

Attempts to produce this phenomenon by use of the developing embryo, which is highly susceptible to myxomatosis, proved negative.
—J. S. PATERSON.

PACKALÉN, T. (1941). **A Study of Quantitative Changes of the Shope Rabbit Papilloma Virus at the Site of Inoculation in the Skin of the Cottontail and Domestic Rabbit.**—*J. exp. Med.* **73.** 1–5.

By excising the site of inoculation and titrating its virus content, P. has shown that active virus disappears within 24 hours. Since the greater part of the virus disappeared in 15–60 min., P. considers that it had probably been inactivated and not merely been transported to another locus. The virus reappeared as a rule only with the appearance of recognizable papillomas in the cottontail rabbit and did not reappear at all in the domestic rabbit.

P. recognizes that the rate of disappearance of the virus may be altered by the use of a stronger virus suspension. He suggests that further experiments should be carried out to determine whether the virus is destroyed or merely inactivated, and to find out the exact stage in the formation of the papilloma at which the virus reappears in the cottontail rabbit.—J. S. PATERSON.

IMMUNITY

LEGG, J., & MAUNDER, J. C. J. (1941). **Synthetic Medium Tuberculins: Tests with the C.S.L. Product H9-2.**—*Aust. vet. J.* **17.** 16–18.

The authors recently recorded [*V. B.* **11.** 699.] results obtained in the field with Australian " synthetic " tuberculin. They now report on tests with a tuberculin produced by the same laboratory and concentrated by ultrafiltration. 458 cows were tested and all were subsequently examined at autopsy. Of 416 animals in which no lesions were found the test had been positive in three. Of 16 in which small lesions were found, 14 had reacted ; all of 16 showing moderate lesions had given a positive reaction. Ten showed generalized lesions ; of these five had given a negative reaction.—W. I. B. BEVERIDGE.

PEGREFFI, G., & MAMELI, I. (1938). Sull'esistenza del precipitinogeno carbonchioso nelle pelli degli animali vaccinati. **[The Precipitin Test for the Diagnosis of Anthrax Infection in Hides].**—*Biochim. Terap. sper.* **25.** 107–115. [English, French and German summaries].

In a large number of tests, the authors found that Ascoli's reaction was negative when applied to extracts of fresh, dried, or salted hides of animals which had died of causes other than anthrax more than ten days after anti-anthrax vaccination. The reaction was also negative with the hides of animals which had recovered from natural or experimental anthrax infection. Positive Ascoli reactions were obtained, however, from the hides of animals which had died from anthrax vaccination accidents or from other causes within a week after they had been vaccinated.

G. pig inoculation confirmed a positive Ascoli reaction in 13 of 14 tests carried out with hides from animals dead of natural anthrax infection.—MILLER WATSON.

MARSH, H. (1941). **Standardisation of Stained Brucella Abortus Antigen for the Whole-Blood Test.**—*Amer. J. vet. Res.* **2.** 46–49.

An antigen previously prepared was found to be rather too sensitive. The addition of 0·4% gelatin was therefore discontinued and five strains were used in the preparation of antigen instead of one. The sensitivity was still not constant. The emulsions were then washed off with larger quantities of phenolized saline, filtered, and re-washed in phenolized saline, being finally made up to an 11% suspension. Experiments were then performed on the method of adding dye, on the best dye to use, and on the concentration. Crystal violet was found to have the same effects as gentian violet as regards sensitivity, but results were more easily read when the former dye was used. The optimum concentration was found to be 5% of 1·5% aqueous solution or a final concentration of 0·075%. The effect of this concentration of crystal violet on sensitivity corresponds to the effect of 0·4% of gelatin.—S. J. GILBERT.

CHAPIN, R. M., SCHAFFER, J. M., & LE DUC, P. W. (1939). **The Control of Brucella Agglutination Antigen by Means of Dried Serum.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass. 1938.* pp. 31–38.

A description is given of the method and apparatus used for drying serum in the frozen state. The dried serum is made ready for use by the addition of distilled water. Dried samples of a number of given sera are sent for comparative testing to all laboratories which are co-operating in the control scheme. The results of all the tests are combined to give an average reading and to assist the various laboratories to re-arrange their technique and so to obtain more general agreement. Tube and plate antigens are used. The method by which the average reading is obtained by both tube and plate methods is described. The reader should refer to the original for details.
—S. J. GILBERT.

I. WESTWATER, J. O. (1940). **Antibody Formation in a Lesion Produced by Tubercle Bacilli Suspended in Paraffin Oil. Excision of the Antigenic Depot.**—*J. Immunol.* **38.** 267–272.

II. WESTWATER, J. O. (1940). **Antibody Formation in a Tuberculous Lesion at the Site of Inoculation.**—*J. exp. Med.* **71.** 455–467.

I. To determine whether the tubercle bacillus, which causes antibodies to appear slowly in the serum (2–3 weeks after injection), will stimulate antibody production after the antigenic depot has been excised, W. inoculated a series of rabbits intracutaneously with heat-killed tubercle bacilli suspended in liquid

paraffin. At intervals varying from 1 min. to 14 days after injection, the site of inoculation or the lesion produced was excised. Complement-fixation tests were carried out on the sera of the rabbits from which the site had been excised and also on that of controls, which had been inoculated but in which there had been no excision. It was found that no antibodies could be demonstrated when excision took place within an hour of injection, that antibodies made their appearance when excision was delayed six hours or more, and that the ultimate titre of the serum was always higher in those animals in which skin excision had either not been carried out or had been delayed until 30 hours after injection.

II. A series of experiments in rabbits was carried out to ascertain whether the appearance of antibodies at the site of inoculation was due either to a local production or to a local accumulation of these substances.

In each experiment the animals received intracutaneously three inoculations of different concentrations of heat-killed tubercle bacilli in liquid paraffin. In one experiment the rabbits received larger doses than in the others; in a second they were, in addition, injected intracutaneously with cod liver oil at the time of inoculation, while in a third a further injection of heat-killed tubercle bacilli was given 21 days after the primary inoculation. Regular tuberculin tests were carried out and at suitable intervals c.-f. tests were made on the sera. The animals were killed after varying periods and the areas of the skin where the injections had been carried out were excised and saline emulsions made from them and also from certain of the internal organs. After treatment a c.-f. test was performed on each extract.

It was found that antibodies appeared earlier in the lesion at the site of inoculation than in the blood serum, and that in treated extracts from the local lesion the antibodies were, for a period of about three weeks after inoculation, in a higher concentration than in the blood although it appears probable that after this period has elapsed the reverse may occur. W. suggests that definite evidence is shown that antibodies are formed in the skin at the site of inoculation of tubercle bacilli.—J. R. L.

PAULING, L. (1940). **A Theory of the Structure and Process of Formation of Antibodies.** —*J. Amer. chem. Soc.* **62.** 2643–2657.

P. describes a theory which he has compounded on the structure and process of formation of antibodies and the nature of serological reactions. He shows that many of the reported experimental results are compatible with the theory which, in the main, is based on the assumption that antibodies differ from normal serum globulin only in the way in which the two end parts of the globulin polypeptide chain are coiled, these parts, as a result of their amino-acid composition and order, having accessible a great many configurations with nearly the same stability. A possible method of producing antibodies from serum or globulin solution outside the animal body is mentioned.—ALEX. THOMSON.

CHAMBERS, L. A., BATEMAN, J. B., & CALKINS, H. E. (1941). **Further Studies of the Orientation of Reactive Sites in Thin Films of Streptococcal Antigens.**—*J. Immunol.* **40.** 483–496.

In an "incompletely expanded" surface film there is lack of opportunity for molecular orientation, preventing the development of any facial specificity, which is an unique property of the surface-spread molecules of a "completely expanded" film. "Completely expanded" films of the streptococcal derivatives NPA (nucleo-protein agglutinogen, phosphorus content 0·75%), and P_6 (essentially NPA freed from nucleic acid), show significant differences in the reactivity of the water- (AB) and air- (A) faces towards homologous and heterologous antisera; with "incompletely expanded" films, differences between AB and A are largely obliterated.

Variations in the AB : A ratios of counts of organisms adsorbed on the deposited films in the presence of antisera indicate the presence of at least two types of reactive site, behaving independently of each other, one type of site appearing to occupy the air-face of the film and the other the water-face. Qualitative differences between NPA and P_6 were not obvious, and it is concluded that nucleic acid probably contributes nothing to the serological reactivity of the materials which form the surface films. —E. COTCHIN.

BAILEY, G. H., & RAFFEL, S. (1941). **The Antigenic Properties and Tissue Specificity of Broths as Shown by Precipitation, Complement Fixation and Anaphylaxis.**—*Amer. J. Hyg.* Sect. B. **33.** 86–100.

It has previously been shown that bacteria absorb agar or certain constituents of the media in which they are grown and that these substances cannot be removed by subsequent washing with saline.

Precipitation, complement-fixation, and active and passive anaphylaxis tests showed that infusion broths made from different agars and tissues of various species of animals are almost non-antigenic but that they contain certain specific substances which, when adsorbed on to bacteria, kaolin, animal charcoal, or collodion, are actively antigenic in rabbits. Positive immunological tests may be obtained when either homologous or heterologous bacteria are grown in these broths and this may have led to frequent erroneous conclusions as to bacterial relationship.

The original article should be consulted for details of the immunological relationships between the numerous broths tested and between certain bacterial antigens.—J. Francis.

Hoyle, L. (1940). **Complement Fixation with the Shope Rabbit Papilloma Virus.**—*J. Path. Bact.* **50.** 169–170.

Complement-fixing antibody was found in the sera of 16 out of 26 rabbits carrying the Shope papilloma, in titres of 1 : 2–1 : 16, but was not found in normal rabbits. The amount of complement-fixing antigen in glycerinated samples of cottontail papillomas was found to be greatest in highly infective samples. Filtration experiments with gradocol membranes indicated that the complement-fixing substance was the virus particle itself and not a soluble antigen.

With influenza virus the precipitation of complement-fixing antigen by the addition of 0·03% acetic acid followed by re-solution in phosphate buffer of pH 7·4 effects the liberation of a soluble complement-fixing antigen free from virus. This did not occur with the Shope papilloma virus, and it is concluded that this virus does not elaborate a soluble antigen as do many of the larger viruses.—John Francis.

Amies, C. R. (1941). **The Stability of Tetanus Antitoxin Under Suboptimal Storage Conditions.**—*Brit. med. J.* May 10th. 709–710.

A. records the results of his experiments on the potency of tetanus antitoxin stored at different temperatures for varying lengths of time. He found that at room temperature there was a loss of less than 10% of potency and at 37°C. a loss of less than 50% after one year.

He states that, contrary to common belief, the freezing of serum containing 0·35% cresol has no appreciable effect on the antibody.

—Alex. Thomson.

Rich, A. R. (1941). **The Significance of Hypersensitivity in Infections.**—*Physiol. Rev.* **21.** 70–111.

A review of the literature on hypersensitivity is employed by R. to demonstrate the similarity between bacterial hypersensitivity and the intensified local anaphylactic or Arthus type of sensitivity, with regard to the necessity for the presence of specific antibodies, and to demonstrate the differences between them with reference to the interval between contact and reaction, the effect on the smooth muscle of the sensitized body, passive transference of antibodies, and the mechanism of tissue damage. The question of the dependence of bacterial hypersensitivity upon the presence of antibody is discussed, as well as the nature of the sensitizing antigen. There follows a detailed consideration of the part played by hypersensitivity in the production of symptoms and in resistance to infection, and of its influence upon the character of the lesions. Accumulated evidence, obtained from a review of studies by a variety of methods and in widely different types of infection, is presented to show that neither of the two basic manifestations of acquired immunity (the inhibition of bacterial invasiveness and the suppression of bacterial ability to multiply within the host tissues) depends upon hypersensitive inflammation. Hypersensitivity, in R.'s opinion, is to be regarded as a condition which, although decidedly harmful in some cases, in others may exist without being either injurious or beneficial and has yet to be proved an essential for the successful operation of acquired immunity.—R. O. Muir.

Rocha e Silva, M. (1940). **Concerning the Mechanism of Anaphylactic and Tryptic Shock.**—*J. Immunol.* **40.** 399–404.

In experiments on the isolated virgin uterus of g. pigs sensitized by antigen (horse serum), and on sensitized rabbits, the author demonstrated that there is no cross-desensitization between trypsin and antigen, although the mechanism of production of symptoms produced by trypsin and antigen seems to depend

on the liberation of histamine from the tissues. S. states that this failure to cross-desensitize suggests that the site of action of substances such as trypsin and some animal poisons (bee and snake venom) is not identical with that of antigen.—ALEX. THOMSON.

JAQUES, L. B., & WATERS, E. T. (1941). **The Identity and Origin of the Anticoagulant of Anaphylactic Shock in the Dog.**—*J. Physiol.* **99.** 454–466.

The anti-coagulant produced in the blood of dogs with anaphylactic shock is heparin; this was isolated in good yields from dogs in anaphylactic shock and its rate of appearance and subsequent disappearance from the blood was measured by a protamine titration. The heparin prepared from dogs was somewhat different from beef heparin, the anti-coagulating power of the former being 2·5 times that of the latter.—F. AYLWARD.

KOPELOFF, N., & KOPELOFF, L. M. (1940). **Blood Platelets in Anaphylaxis.**—*J. Immunol.* **40.** 471–481.

In a series of experiments on monkeys, g. pigs, and rabbits, the authors found that in anaphylaxis induced by specific antigen there was a significant decrease in blood platelets. This, however, also occurred in desensitized animals where the degree of shock was mild or absent, although there was no such decrease in animals shocked by histamine alone, or in non-sensitized animals injected with large doses of the antigen.
—ALEX. THOMSON.

I. WILSON, E. B., & WORCESTER, J. (1941). **Contact with Measles.**—*Proc. nat. Acad. Sci.* **27.** 7–13.

II. WILSON, E. B., & WORCESTER, J. (1941). **Progressive Immunization.**—*Ibid.* 129–135.

I. The authors discuss the immunity of a population acquired through contact of its individuals with a virus, on the assumption of the "all-or-none" hypothesis, that is, that the disease was acquired at the first contact and a lasting immunity resulted.

II. Consideration is given to the enhancement of the immunity of a population from successive contacts of its individuals with the pathogenic agent. The treatment of the question is purely mathematical and the conclusions bear out a previous statement that it is not necessary to infer from the similarity of age distribution of two diseases that the immunizing processes relative to the individual are similar; with one disease the "all-or-none" principle may apply and with another it may be progressive, with essentially similar curves of age distribution. The reader is referred to the original for the mathematical evidence on which these conclusions are based.—ALFRED EDEN.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

MILLER, D. (1939). **Blow-flies (Calliphoridae), and their Associates in New Zealand.**—*Cawthron Inst. Monogr.* No. 2. pp. 68.

Sections are devoted to the control of sheep blowflies and to a historical review of native and introduced muscids. The primary flies concerned in sheep myiasis are *Lucilia sericata*, an unidentified species of *Lucilia* designated as A, *Calliphora laemica*, and *C. rufipes*, and the secondaries are *C. quadrimaculata*, *C. hortona*, and *Chrysomyia rufifacies*.

The greater part of the monograph is concerned with the systematics of New Zealand Calliphoridae, and detailed specific descriptions of the adult and larval stages are given.
—M. B. BUDDLE.

LENNOX, F. G. (1940). **Studies of the Physiology and Toxicology of Blowflies. 2. The Action of Stomach Larvicides on** *Lucilia cuprina*.—*Pamph. Coun. sci. industr. Res. Aust.* No. 101. pp. 9–49. [For part I, see *V. B.* **11.** 371].

LENNOX, F. G., & WEBBER, L. G. (1940). **Studies of the Physiology and Toxicology of Blowflies. 3. The Toxicity of Some Arsenicals to Larvae of** *Lucilia cuprina*. —*Ibid.* pp. 51–67.

LENNOX, F. G. (1940). **Studies of the Physiology and Toxicology of Blowflies. 4. The Action of Contact Larvicides on** *Lucilia cuprina*.—*Ibid.* pp. 69–131.

WATERHOUSE, D. F. (1940). **Studies of the Physiology and Toxicology of Blowflies. 5. The Hydrogen Ion Concentration in The Alimentary Canal. 6. The Absorption and Distribution of Iron.**—*Ibid.* No. 102. pp. 7–27, and 28–50.

LENNOX, F. G. (1940). **Studies of the Physiology and Toxicology of Blowflies. 7. A Quantitative Examination of the Iron**

Content of *Lucilia cuprina.—Ibid.* pp. 51–67.

2. Two methods are described for measuring the stomach toxicities of chemicals after they have been incorporated in synthetic nutrient media. In the first method sterilized eggs are placed on the poison-impregnated media, and growth retardation of the larvae which hatch is measured photographically. In the second method the rate of mortality of partly grown larvae is recorded after transfer to the poison-impregnated media. A wide range of compounds was tested. Amongst the most toxic were nicotine, phenothiazine, and arsenic and selenium compounds. Attempts to modify the structure of phenothiazine without affecting its toxicity were unsuccessful. Of a representative series of dyes, methylene blue and the triphenylmethane group were most effective.

The original should be consulted for details of methods.

3. Using methods described in 2 above, the authors determined the relative toxicities of arsenical compounds. There was no correlation between toxicity and arsenic content of a given compound. The highly toxic compounds, in decreasing order of toxicity, were barium arsenite, calcium arsenite, arsenic acid, Paris green, and arsenious oxide. The moderately toxic compounds were the arsenates of zinc, aluminium, lead, and calcium.

4. A method is described for measuring the contact toxicities of liquids to *L. cuprina* larvae by totally immersing a constant number of prepupae in the test liquid under standard conditions and determining the percentage which is unable to complete metamorphosis. Concentration-mortality curves, time-mortality curves, and drug antagonism are discussed.

Tests of a wide variety of liquid organic chemicals showed that aliphatic halogenated and aromatic hydrocarbons were exceptionally potent. In the normal aliphatic alcohols or fatty acids, toxicity increased as the carbon chain lengthened within the homologous series. Isomers of alcohols or acids were less toxic than the corresponding normal compounds. Aqueous solutions of nicotine were considerably more toxic than solutions of nicotine sulphate. The most toxic of the essential oils were caraway, dill, mustard, origanum, and thyme. Coal tar fractions showed toxicities increasing with volatility and tar acid content. Lipoid solvents were exceptionally toxic to *L. cuprina*, and it was considered that this was due to solution of the outer cuticular layers of the larvae.

5. The pH of the gut contents of larvae and adults of nine Australian species of sheep blowflies was determined by feeding them upon substrates containing indicators.

6. Iron was found to be absorbed by a band of cells in the posterior end of the acid region of the midgut of larvae. In the adult fly iron was absorbed by the entire midgut.

7. The total iron contents of eggs, larvae, and pupae of *L. cuprina* were estimated by the thiocyanate and dipyridyl methods.

—H. McL. Gordon.

Gill, D. A., & Graham, N. P. H. (1940). **Studies on Fly Strike in Merino Sheep. No. 4. The Effect of Fly Strike on Reproduction. No. 5. Review of Results Obtained by the Mules Operation for the Prevention of Crutch Strike in the Trial at "Dungalear", N.S.W.**—*J. Coun. sci. industr. Res. Aust.* **13.** 261–266 and 266–272. [For previous parts, see *V. B.* **11.** 371].

4. Owing to the low incidence of blowfly strike, no clear-cut evidence was obtained as to the effect of strike incurred during or near to the mating period on the percentage of lambs born, but the data tend to show that ewes having wrinkled breeches (B and C class) are not inherently less fertile than those having plain breeches (A class), that the percentage of ewes which lambed was, however, lower among ewes struck during the mating period than among those not struck, and that among ewes struck more than once during the mating period, the tendency to remain non-pregnant increased with the number of strikes incurred.

A method is described for accurate recording of lambings under field conditions.

5. The untreated sheep tended to become plainer, *i.e.* less wrinkly, as they grew older. The Mules operation reduced the incidence of fly strike in the crutch area by 93%. In treated sheep, relatively high incidences of crutch strike occurred only when scouring followed ingestion of a succulent weed, and when crutching (shearing away wool from the crutch area) had been delayed for seven months. Even under these conditions, however, there were more than three strikes among the control sheep for every one among the treated sheep.

Highly susceptible sheep were frequently struck on the crutch even after crutching.

The performance of the Mules operation on sheep having relatively non-wrinkled crutch regions (B class sheep) reduced strike incidence by 86%. The effect of the operation was permanent throughout the course of the trial (about three years). The incidence of blowfly strike during the trial was highest in the spring and autumn, the autumn waves tending to persist over a longer period. Hot weather, with mean shade temperatures over 82°F. for any considerable period, seemed to eliminate strike irrespective of the rainfall. Strikes also ceased when the mean shade temperature fell below 51°F. for any considerable period. During the more temperate periods rains were almost invariably followed by fly strike.

—H. McL. Gordon.

Soni, B. N. (1940). **The Structure of the Mouth-Parts of Young Larval Forms of** *Hypoderma crossii*.—*Indian J. vet. Sci.* **10.** 291–292.

The anterior end of the mouth-hook of the young [Laake's "third-stage"] larva of *H. crossii* is not forked or notched, whilst the median spear of the cephalopharyngeal skeleton is provided at the top with two comma-shaped structures. These characters differentiate *H. crossii* from *H. lineatum* and *H. bovis*.—S. K. S.

Soni, B. N. (1940). **Preliminary Observations on the Bionomics of the Goat Warble Fly (***Hypoderma crossii* **Patton).**—*Indian J. vet. Sci.* **10.** 280–283.

H. crossii is recorded from the Punjab, the North-West Frontier Province, Sind, Kashmir, and the Kulu valley. The larvae were encountered in the subcutaneous tissues of goats, and occasionally of sheep, from the end of August to the middle of March. Long-haired breeds of goats were most commonly infested. No evidence was obtained of *H. crossii* infestation in cattle.—S. K. Sen.

Zumpt, F. (1940). Die Verbreitung der *Glossina palpalis*-Subspezies im Belgischen Kongogebiet. **[Distribution of the Subspecies of** *G. palpalis* **in the Belgian Congo].**—*Rev. Zool. Bot. afr.* **33.** 136–149. [Abst. from abst. in *Rev. appl. Ent.* **28.** 140].

The receipt from the Congo Museum at Tervueren of almost 2,300 examples of *G. palpalis* from different parts of the Belgian Congo led Z. to confirm the validity of the three subspecies previously erected by him and to dispute the conclusions of Patton. All three subspecies occur in the Congo region, together with intermediate forms. Z. pointed out that, although the form of *G. palpalis* from which the species was described is unknown, it was more probably that from the region at the mouth of the Congo than that found further inland, and he, therefore, gives the name *G. palpalis palpalis* to the former, which Patton called var. *wellmani*. He considered that Patton's type form was *G.p. fuscipes*, and his var. *fuscipes* a mixture of *G.p. fuscipes* and *G.p. martinii*.

The paper includes a map of the identifiable localities in the Belgian Congo from which the three subspecies and the intermediate forms were recorded. The subspecies *palpalis* is found only in the region round the mouth of the Congo, as far east as Thysville. The subspecies *fuscipes* is the most widely distributed; it is present in its typical form in the immense rain-forest region between the Kassai-Sankuru, Congo, and Ubangi rivers and extends eastwards as far as the Rift Valley, north of Lake Kivu. The subspecies *martinii* is found in the Rift Valley south of Lake Kivu and in an area extending westwards to the headwaters of the Sankuru River.

Schmid, F. (1940). Ergebnisse neuerer Forschungen über die Räude der Einhufer. **[Results of Recent Research on Mange in Horses].**—*Berl. Münch. tierärztl. Wschr.* Aug. 30th. 417–420.

This is a detailed review, with a long reference list, on sarcoptic, psoroptic, and chorioptic mange in equines.

After some notes on the nomenclature of *Sarcoptes*, which has a single species *scabei* with several varieties for the various animal species, the review quotes findings on the life-history, viability in adverse conditions, transmissibility to animals and man, and on the clinical symptoms, diagnosis and treatment of mange.

[Demodectic mange, often wrongly named *Akarusräude* in German veterinary articles, is not included in this review.]—J. E.

Zumpt, F. (1939). Die Rhipicephalusarten der USSR. Ein Beitrag zur Variabilität in der Sanguineusgruppe. 1. Vorstudie zu einer Revision der Gattung Rhipicephalus Koch. **[Species of** *Rhipicephalus* **in the U.S.S.R. Variability in the**

sanguineus **Group. I. Preliminary Revision of the Genus** *Rhipicephalus*].—*Z. Parasitenk.* **11.** 400–409.

After examining specimens of *Rhipicephalus* from the Russian collection at Leningrad, Z. concludes that *R. rossicus* can be considered only a subspecies of *R. sanguineus* as the characteristics which have been relied on to distinguish the two species are not constant and transitional forms occur. He considers that *R. schulzei* is a true species as both males and females can be distinguished from those of *R. sanguineus* by their smaller size, whilst the anal plates of the males are three-cornered instead of four-cornered, and the spiracles have a distinct tapering prolongation. *R. pumilio* is considered to be a synonym of *R. schulzei*. The only species of *Rhipicephalus* encountered in Russia apart from these members of the *sanguineus* group, is *R. bursa*.—U. F. R.

SAPRE, S. N. (1940). **The Life-History of** *Boophilus australis* **(Fuller).**—*Indian J. vet. Sci.* **10.** 346–353.

S. deals with the life-history of *B. australis*, one of the commonest Indian ticks, under conditions prevailing at Mukteswar (altitude 7,500 ft.). The completion of two generations in one year was observed. The first generation, starting with eggs hatching in April, completes its cycle by the end of June. The numbers in this generation are rather small, owing to the cold winter through which the eggs must pass before hatching and the lack of necessary humidity for successful development during the summer months. The second generation which lasts from July–November is very numerous.

Egg counts showed that at 22°C. and appropriate humidity, a single female tick can lay on an average 2,450 eggs in 18 days; this average is based on many layings of 1,080–4,725 eggs each and on one of 200. Short accounts of the behaviour at different stages in the life-history are included.—B. N. SONI.

HAMILTON, D. G. (1940). **Tick Paralysis: A Dangerous Disease in Children.**—*Med. J. Aust.* June 1st. 759–765.

Tick paralysis, a disease occurring in man and in domestic animals, is described as it occurs in man. The causal parasite, *Ixodes holocyclus*, is described. A number of cases is discussed. Treatment with hyperimmune serum from dogs was beneficial. Reasons for the occasional localization of the paralysis are discussed, and it is suggested that the path by which the toxin reaches the central nervous system is the axis cylinders of the peripheral nerves.—H. McL. GORDON.

MULES, M. W. (1940). **Notes on the Life History and Artificial Breeding of the Australian "Stickfast" Flea,** *Echidnophaga myrmecobii* **Rothschild.**—*Aust. J. exp. Biol. med. Sci.* **18.** 385–390.

The life-history of *E. myrmecobii* is described and details are given of the technique and apparatus used in artificial cultivation. Optimum temperature for breeding immature stages is 22°C. The life-cycle is complete in 30–46 days, the periods in the cycle being:– pre-oviposition 4–5 days, egg incubation 4–5 days, larval period 10–14 days, and pupal period 12–22 days. Rabbits and rats were used as host animals.

The object of the experiments was to develop methods for breeding and handling *E. myrmecobii* with the ultimate aim of determining their capacity to act as vectors of the virus of rabbit myxomatosis.—H. McL. GORDON.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

MAPLESTONE, P. A., & BHADURI, N. V. (1940). **The Helminth Parasites of Dogs in Calcutta and their Bearing on Human Parasitology.**—*Indian J. med. Res.* **28.** 595–604.

A survey of the helminth fauna of 200 stray dogs captured in Calcutta. The main objects were to ascertain the incidence of *Echinococcus granulosus*, and to discover whether *Taenia ovis* was present. All the organs were carefully scrutinized and all the worms found were identified. *Trichinella spiralis* was not found. *Diphyllobothrium mansoni* was found once, and *Trichostrongylus colubriformis* six times. The public health significance of dog parasites is discussed, and from this standpoint *E. granulosus*, which was found in 20 (10%) of the dogs examined, is considered to be the most important, while *T. ovis* (not found), *Heterophyes heterophyes* (found 85 times), and *Opisthorchis felineus* (found six times) appear to be of no consequence.—S. C. A. DATTA.

DE SOMMAIN, G. (1939). Le alterazioni del pancreas nella distomatosi epatica degli ovini. [**Alteration in the Pancreas in Hepatic Distomatosis of Sheep**].—*Azione vet.* **8.** 444–447.

The author discussed previous work on the relationship between hepatic cirrhosis and alterations in the pancreas, and described cases he had studied.

A number of sheep killed in the abattoir at Pisa had extensive liver cirrhosis due to *Fasciola hepatica* infestation, and most of them showed pancreatic abnormality. The pancreas was whitish and opaque and on section did not have the moist glandular appearance of the normal organ. Microscopically it was found to have undergone considerable fibrosis, especially at the periphery, with corresponding reduction of the glandular tissue. In some cases there was evidence of venous stasis and periarteritis. In two cases trematodes could be identified in the pancreatic ducts.

The degree of pancreatic degeneration was not always in direct relationship to the severity of the liver cirrhosis.—MILLER WATSON.

GIOVANNOLA, A. (1938). Osservazioni sui gasteropodi della Sardegna d'importanza medica e veterinaria. [**Snails of Sardinia of Medical and Veterinary Interest**]. —*R.C. Ist. Sanit. pubbl., Roma.* **1.** 506–517.

Eight species of snails were observed in Sardinia, among which *Limnaea palustris* is considered to be an intermediate host of *Fasciola hepatica* and *Bulinus contortus* a host of *Schistosoma bovis*.—J. E.

I. HOEPPLI, R., & CHU, H. J. (1937). **Studies on Clonorchis Sinensis in Vitro.** —*Festschr. Bernhard Nocht, 1937.* pp. 199–203. Hamburg: Friederichsen de Gruyter & Co. [In English].

II. CHU, H. J. (1938). **Studies on *Clonorchis sinensis* in vitro. Part II. Action of Various Dyes.**—*Chin. med. J.* **54.** 409–415. [In English].

I. The authors used the technique developed by LEE & CHU [*V. B.* **6.** 48.] for *in vitro* work on *Schistosoma japonicum*, and the culture media described by HOEPPLI, FENG, & CHU [*V. B.* **10.** 353]. The greatest survival periods attained for *C. sinensis* were :– (a) with change of medium once a week, five months for adult and immature specimens, and one month for fragments of adult worms, in diluted horse serum with or without traces of glycogen, cystine, lecithin, haemoglobin, or bile, and (b) without change of medium, three weeks for adults in horse-serum media, 53 days in a 1 : 40,000 solution of mercurochrome-220 in diluted horse serum, and 53 days in a 1 : 40,000 solution and 65 days in a 1 : 8,000 solution of prontosil in diluted horse serum. Careful adjustment of the pH of the medium was found to be necessary, the optimum range being pH 7–8. The rapidity with which some media change their pH on standing, even without worms, is emphasized.

Microscopic examination of carmine-stained celloidin sections revealed no morphological change in the glycogen content of the worms during these prolonged periods. Quantitative chemical estimations were not carried out.

II. C. tested 16 dyes of the aniline, phthaline, acridine, and sulphonamide groups for their power to kill *C. sinensis* in vitro. The medium used was horse serum diluted with an equal amount of Ringer's solution, to which the dyes were added in concentrations of 1 : 2,500–1 : 400,000. It was found that, at a concentration of 1 : 40,000, gentian violet, malachite green, and Nile-blue sulphate killed the worms within 24 hours, gentian violet being the most effective. This result supports previous work on the *in vivo* anthelmintic action of gentian violet against *C. sinensis*.

Individual specimens survived 35 days in 1 : 40,000 trypanblue and 42 days in 1 : 100,000 methyl violet.—E. S.

CHU, H. J. (1940). **Studies on *Clonorchis sinensis* in vitro. Part III. Survival Period in Relation to Certain Dyes.**—*Chin. med. J.* Suppl. No. 3. 255–259. [In English].

Adult *C. sinensis* were maintained in horse serum diluted with an equal amount of Tyrode's solution to which were added methyl green, trypanblue, or acid fuchsin in concentrations of 1 : 2,500, 1 : 5,000, and 1 : 400,000. Each of the dyes prolonged the survival period of the worms, the prolongation being most marked in the case of methyl green (135 days at 1 : 5,000) and trypanblue (51 days at 1 : 2,500), the action of both drugs being reduced at the lowest concentration. Acid fuchsin was the least effective and the various concentrations used had no significant influence on the survival period.

—M. L. BINGHAM.

MILLER, M. J. (1940). **Black Spot in Fishes.**—*Canad. J. comp. Med.* **4.** 303–305.

M. discusses generally those larval trematodes which cause black spot in fishes in Canada. *Apophallus imperator*, a heterophyid causing black spot in brook trout, will develop experimentally in kittens and in birds. The snail host is *Amnicola limosa*.—T. W. M. C.

CHANDLER, A. C. (1940). **Failure of Artificial Immunization to Influence *Hymenolepis diminuta* Infection in Rats.**—*Amer. J. Hyg.* Sect. D. **31.** 17–22.

Attempts were made to produce immunity in rats by feeding freshly pulped adult tapeworms and by implanting adult parasites into the body cavity. Both of these methods failed to influence the establishment and growth of infective cysticercoids.

Further attempts were made unsuccessfully to produce immunity by the subcutaneous injection of antigens prepared from cattle *Moniezia* and *H. diminuta*. These latter results are not in harmony with those obtained by other workers using other tapeworms, and it was emphasized that generalizations with respect to cestode immunity are at present premature.—A. L. WILSON.

ROBERTS, F. H. S. (1940). **The Incidence, Prevalence and Distribution of the Helminths Infesting the Lungs and Alimentary Tract of the Pig in Queensland.**—*Aust. vet. J.* **16.** 259–266.

Of a total of 243 pigs examined, 76·6% were infested and 14 species of helminths were involved. The incidence and prevalence of each of these were determined. It is believed that the factors governing variations in incidence and prevalence are associated with climatic conditions. It is believed that *Ascaris lumbricoides*, *Hyostrongylus rubidus*, *Physocephalus sexalatus*, *Ascarops strongylina*, and *Oesophagostomum* spp. are the most important species from the economic point of view. A check list is given of the 20 helminth species recorded from pigs in Queensland.

—H. McL. GORDON.

I. LAWLER, H. J. (1940). **Passive Transfer of Immunity to the Nematode, *Strongyloides ratti*.**—*Amer. J. Hyg.* Sect. D. **31.** 28–31.

II. AUGUSTINE, D. L. (1940). **Experimental Studies on the Validity of Species in the Genus Strongyloides.**—*Ibid.* **32.** 24–32.

I. In a series of experiments, plasma from rats actively immunized by a dose of 1,000 larvae was injected into susceptible rats before and after infestation with a test dose of larvae. The data obtained revealed that passive immunity was conferred, since many more parasites were found in the intestines of the controls than of the immunized rats. *In vitro* tests showed that the immunity was due in some measure to the ability of the immune plasma to precipitate the metabolic products of the infective larvae.

II. The free-living stages of four separate strains of *Strongyloides* were studied, including three natural primate strains, (1) from *Pan troglodytes*, the chimpanzee, (2) from *Cebus apella*, a South American monkey, (3) from the common laboratory macaque, and (4) a natural strain from the dog. Several generations of free-living adults were produced by the three primate strains. The offspring of a single fertilized female consisted of filariform larvae, females, and very occasionally males. The dog strain developed one generation of adult males and females, and these in turn produced only filariform larvae. The life-span of the free-living adults of the four strains varied. Males lived 4–9 days and mated females 2–12 days, while a few unfertilized females were kept alive for 15 days.

Cross-breeding experiments attempted with all the strains were unsuccessful: the females developed eggs but these showed no evidence of segmentation.—A. L. WILSON.

*THORSHAUG, K. (1940). Trikinose i Norge. **[Trichinosis in Norway].**—*Norsk Vet-Tidsskr.* p. 475. [Abst. from abst. in *Skand. VetTidskr.* **30.** 1263–1264].

In May 1939, trichinosis was diagnosed in a fox from a fur animal farm in east Aker. It was also found to be present in 75% of rats caught on this farm and on one other farm in the district. In 264 rats from 26 farms in the district the average incidence of trichinosis was 7·6%. Two out of 31 cats examined were also infected. When foxes were killed in the winter, 55 [from the first mentioned farm ?] were examined and two were found to contain trichinae.

Trichina inspection in pigs was instituted at the local abattoir, but only one pig was found to be trichinous.

T. suggests that the parasite entered Norway

from America either in imported meat or in imported foxes.

I. SPINDLER, L. A., CROSS, S. X., & AVERY, J. L. (1941). **Results of Intracutaneous Tests for the Detection of Trichina Infections in Swine.**—*Proc. helminth. Soc. Wash.* **8.** 1–5.

II. AVERY, J. L. (1941). **A Simple Method of Removing Bacteria that Adhere to Trichina Larvae.**—*Ibid.* 6–7.

I. The results are recorded of a series of 12,435 intracutaneous tests using various antigens for the detection of trichina infection in swine. Of 1,482 tests made on infected pigs, 42·78% were positive, 21·12% were doubtful, and 36·09% gave no reaction. In a group of 10,953 uninfected pigs, 17·51% gave positive reactions, 11·33% were doubtful and 71·15% were negative. In a series of tests in which antigen 165, consisting of ground trichina larvae suspended in Coca's solution or other saline diluent, was used a correct diagnosis was made in 71% of cases, whilst only 53% were correctly diagnosed when a saline extract of dried powdered larvae was used. Of a total of 2,810 control tests, positive reactions occurred in 4·76%.

II. The method is purely mechanical. The apparatus consists essentially of a 4-litre percolator, the stem of which is connected by rubber tubing with a glass tube. A spring clamp is fixed to the rubber tubing. A single layer of cheesecloth is fitted round the lip of the glass tube and a $\frac{5}{8}$ in. layer of sterile sand is placed on the cloth. The tube is fixed in a 2 oz. bottle, containing sterile Ringer's solution and 0·5% sodium bicarbonate, by means of a tightly fitting rubber stopper. The "sand tube" and bottle are autoclaved before the apparatus is assembled. The trichinous meat and digestive fluid are placed in the percolator, the clamp is slowly released, and after 18–20 hours' incubation at 37°C. the majority of larvae, by gravity and their own activity, pass through the sterile sand into the bottle, from which they may be recovered free from bacteria.—M. L. BINGHAM.

I. ROTH, H. (1939). **Experimental Studies on the Course of Trichina Infection in Guinea Pigs. II. Natural Susceptibility of the Guinea Pig to Experimental Trichina Infection.**—*Amer. J. Hyg.* Sect. D. **29.** 89–104. [For parts I and III, see *V. B.* **10.** 598 and **11.** 873].

II. MAUSS, E. A. (1940). **Transmission of Immunity to *Trichinella spiralis* from Infected Animals to their Offspring.**—*Ibid.* **32.** 75–79.

III. MAUSS, E. A. (1940). **The in vitro Effect of Immune Serum upon *Trichinella spiralis* Larvae.**—*Ibid.* 80–88.

I. The larvae used were counted by a sedimentation technique which is described. 130 g. pigs were used and the infestation was determined eight weeks after infection.

The ratio of the infestation of a group of test muscles (masseters, diaphragm, upper portions of the front legs, and shanks of the hind legs) to the infestation of the total musculature was found to be 1 : 5 or less when the larvae in the test muscles numbered much less than 100,000. When the number of the latter was greater than 100,000 the ratio varied between 1 : 5·4 and 1 : 6·6. The explanation of this is the inclusion in the test muscles of the masseters, for which the larvae have a strong predilection in the g. pig. The masseters were always more heavily infested than the diaphragm (the reverse is true in rats), but this predilection for the masseters was most obvious only when the total infestation was slight or moderate.

The minimal lethal dose was 800 larvae. A dose of 2,000 larvae killed 32 out of 34 animals and of these 32, 29 died during the 4th–8th weeks or during the acute muscular stage.

A definite correlation was established between the ratio of larvae in the infecting dose to those found in the muscles and this was independent of the size of the infecting dose. The average ratio was from 1 : 900–1 : 1,000 and corresponded to an average of 1,350–1,500 larvae per female ingested, the number of females being regarded as about two-thirds of the infecting dose.

The great susceptibility of the g. pig to experimental trichinosis is re-emphasized.

II. The transmission of passive immunity was examined in rats, rabbits, and hamsters. The experiments revealed that the offspring of infested animals were less susceptible to infestation than the offspring of uninfested ones. This passive immunity could only have been transferred through the placenta or *via* the mother's milk, but the exact route could not be determined from the experiments. Hamsters lost this decreased susceptibility within three weeks of parturition, and it is stated that the

length of time that antibody persists in the serum of the young is probably related to the physiology of the species. Artificial digestion of the musculature of the young did not reveal any trichinae, thus discounting the possibility of an active immunity as a result of pre-natal infestation.

III. The parasites used were isolated from infested rabbit muscle. The data obtained revealed that larvae incubated at 37°C. for 18 hours in 43% homologous immune serum were only 30% as infective to rats as larvae incubated in 43% homologous normal serum under the same conditions. A similar reduction in infectivity was observed with larvae exposed to 0·9% saline solution. When, however, 10% normal rabbit serum was added to the saline solution, the reduction in the infectivity became statistically insignificant.—A. L. WILSON.

EISENBRANDT, L. L., & ACKERT, J. E. (1940). **On the Resistance of Chickens to the Intestinal Nematode *Ascaridia lineata* (Schneider) Following Immunization.**—*Amer. J. Hyg.* Sect. D. **32.** 1–11.

Investigations were made to determine whether chickens could develop antibodies that would inhibit the growth of *A. lineata* in the intestine. The data obtained showed that the chickens (White Leghorns) did not readily develop immunity after intracardial injections of sterile antigens prepared from the parasite. Some of the birds, however, developed a parenteral immunity. An artificially acquired general body immunity was determined by positive precipitation tests with the sera of injected chickens, but this generally failed to protect the birds as the parasites found in the intestine of the injected birds were not markedly shorter than those in the controls.

The parasite itself did not actively immunize the chickens, and neither the type and quantity of the antigen used, nor the age of the birds when injected, had any special significance.

—A. L. WILSON.

BRITTON, J. W., SALISBURY, G. W., & BAKER, D. W. (1941). **Control of Equine Strongylosis. Part III. The Effect of Pasture Management on the Development of Strongylosis in Foals.**—*Cornell Vet.* **31.** 289–294. [For previous parts, see *V. B.* **11.** 325].

Under the system of rotational grazing and pasture management used, details of which are given, the average rate of pick-up by foals was 1 : 119,205,287 eggs deposited by their dams. The lowest rate of pick-up was 1 : 202,500,000 and the highest 1 : 57,142,871. The average strongyle count in the foals was 500 eggs per gramme of faeces nine months after birth. Comparing the results of the past three years it is stated that the rate of pick-up of infection was 74% less in the 1940 foals than in the 1938 foals and 57% less than in the 1939 foals.

Foals maintained under the above system did not gain significantly in weight, but their general condition was vastly superior to that of the 1938 foals and significantly better than that of the 1939 foals. The system had little effect on the degree of *Parascaris equorum* infestation acquired by the foals. Nevertheless, the increased nutritive value of the grass produced under the system and the lowered numbers of strongyle larvae available allowed the foals to recover from the ascaris infestation much earlier.—A. L. WILSON.

SRIVASTAVA, H. D. (1940). **Verminous Pneumonia in Indian Buffaloes *Bos bubalis*. (Preliminary Report).**—*Indian J. vet. Sci.* **10.** 117–118.

S., in a preliminary report, describes the hitherto unrecorded occurrence of *Protostrongylus rufescens* in the lung of a domestic buffalo.—W. M. KHAN.

RAO, M. A. N. (1940). **On Some Worms of the Genera Trichostrongylus Looss, 1905, and Cooperia Ransom, 1907, in South India.**—*Indian vet. J.* **16.** 306–311.

T. colubriformis and *T. axei* are recorded from the abomasum and duodenum of goats, sheep, and cattle, and *C. punctata* and *C. pectinata* from the abomasum and duodenum of cattle in Madras. In two animals, heavily infested with the two last species, ulceration of the mucous membrane of the abomasum was noticed.—G. D. BHALERAO.

MAYHEW, R. L. (1941). **Studies on Bovine Gastro-intestinal Parasites. V. Immunity to the Stomach Worm, with a Note on the Prepatent Period.**—*Amer. J. Hyg.* Sect. D. **33.** 103–111. [For previous parts, see *V. B.* **11.** 874].

Six calves received varying doses of *Haemonchus contortus* at different intervals and the development of immunity was ascertained by egg counts. The data obtained showed that immunity

developed in the calves when adult *H. contortus* were present in the abomasum, and also when the animals were reinoculated and immature larvae were present. The sudden decrease in the egg counts, which indicated the establishment of the immune state, was not due to loss of the parasites from old age, as the low egg count was maintained over a considerable period. The immune state, moreover, was quite independent of the numbers of larvae in the infecting dose. The lowest age at which immunity developed was 13 weeks and the highest age was 40 weeks.

Studies on the prepatent period revealed that it varied from 14–29 days, thus confirming the results of other workers.—A. L. WILSON.

BUCKLEY, J. J. C. (1940). **Observations on the Vertical Migrations of Infective Larvae of Certain Bursate Nematodes.** —*J. Helminth.* **18.** 173–182.

Observations on the vertical migrations of *Trichonema* spp., *Haemonchus contortus*, and *Ancylostoma caninum* larvae were made under laboratory conditions. For this a glass slide, 3 in. × 1 in., was divided transversely into ten compartments, and the larvae were placed in the middle compartment. The slide was covered by a fine layer of sand, made adherent by spraying with distilled water by means of an atomiser, and was exposed to various temperature and light conditions.

Below 10°C. *Trichonema* larvae showed slight migration, but a positive geotropism was very marked at 13°–14°C. At 19°, 24°, and 37°C. migration occurred both upwards and downwards. *H. contortus* larvae showed only slight migration at 11°C., but positive geotropism was marked at 15°C. and was rather more marked in darkness than in light. The larvae of *A. caninum* showed little migration at 11°–14°C. At the higher temperature, negative geotropism was evident, irrespective of the presence or absence of light. Negative phototropism was more evident during lateral than vertical migration and was more clearly shown by *Trichonema* larvae than by *Haemonchus* larvae.—M. L. BINGHAM.

I. OTTO, G. F., & LANDSBERG, J. W. (1940). **Dietary Deficiencies and Iron Salts in Hookworm Infections.**—*Amer. J. Hyg.* Sect. D. **31.** 37–47.

II. OTTO, G. F., & SCHUGAM, N. J. (1940). **The Occurrence of Adult Hookworms, *Ancylostoma caninum*, in the Lungs of an Experimentally Infected Dog.**—*Ibid.* **32.** 70–74.

I. Seventeen young dogs were used in the experiments, two being maintained on an adequate diet while the diet of the remaining 15 was generally deficient. Seven of these 15 animals received, in addition, 3,000–6,000 mg. of iron ammonium citrate daily. After 42 days on the above diets each dog was given *per os* 900 infective hookworm larvae.

The animals maintained on the adequate diet overcame their infestation successfully. In the animals receiving the iron a marked but apparently transient erythropoiesis developed, but this had no effect on the development or persistence of the parasites nor did it delay the development of fatal anaemia.

II. These data were obtained during investigations on active acquired immunity by OTTO & KERR [*V. B.* 9. 634]. The youngest dog employed was 179 days old when it was infected with 200,000 larvae. The dog died eight days later and 67,620 worms were recovered from the intestine. Of 450 worms recovered from the lungs, 97·4% were third-stage larvae while the remaining 2·6% consisted of one larva that had developed beyond the third stage, two fourth-stage larvae, five males with the bursa completely developed, and four females, in which no eggs were visible. It is postulated that the parasites may develop more rapidly in a young susceptible animal debilitated by an overwhelming infestation.—A. L. WILSON.

CRAWFORD, M. (1940). **Infection of Adult Fowls with *Syngamus trachealis*.**—*Indian J. vet. Sci.* **10.** 293–294.

C. records observations in Ceylon regarding the importance of adult fowls in maintaining and spreading the infection, and questions the current belief that absolute immunity against *S. trachea* can develop with age.—S. C. A. DATTA.

SRIVASTAVA, H. D. (1940). **An Unrecorded Spirurid Worm, *Rictularia cahirensis* Jagerskiold, 1904, from the Intestine of an Indian Cat.**—*Indian J. vet. Sci.* **10.** 113–114.

The worm is recorded from the Punjab and Mukteswar. Lizards (at Mukteswar) contained the encysted larvae and also those of *Mesocestoides lineatus* [see also *V. B.* **10.** 682].

—G. D. BHALERAO.

TOUMANOFF, C. (1939). Recherches sur la transmission de la filariose canine à *Dirofilaria immitis* au Tonkin. [**Transmission of Canine Dirofilariasis by Mosquitoes in Tonkin**].—*Rev. méd. franç. Extr.-Orient.* **17.** 1000–1015. [Abst. from abst. in *Rev. appl. Ent.* **28.** 126–127].

Experiments were carried out on the development of *D. immitis* in five species of mosquitoes, *viz*, *Aëdes aegypti*, *A. albopictus*, *Anopheles vagus*, *A. hyrcanus* var. *sinensis*, and *Culex fatigans*, after they had fed on a heavily infected dog. About 64% of *A. aegypti* and *A. albopictus* died within ten days of the infecting feed, and about 30% of the survivors became infected in summer and about 10% and 2% respectively of each species in winter. Proboscis infection was observed only in the hot, rainy season, and occurred 11–35 days after the infecting feed in 14·4% and 11·8% respectively. Only small numbers of the other three species were used, but it was found that *D. immitis* could complete its development in any of them.

Precipitin tests on 16 species of anophelines collected in parts of Indochina and in Hong Kong, where cattle are abundant, gave few reactions with dog antisera. In a locality free from cattle, however, precipitin tests with the five species mentioned above showed that all had fed on dogs in considerable numbers. It appears that many species are capable of transmitting *D. immitis*, their relative importance depending on circumstances favouring their contact with dogs.

GLASGOW, R. D., & DEPORTE, P. (1939). **Recovery From Excreta of the Pigeon of Viable Eggs of the Giant Thorny-Headed Worm of Swine.**—*J. econ. Ent.* **32.** 882.

Eggs of *Macracanthorhynchus hirudinaceus*, after passage through the alimentary tract of the pigeon, were found to undergo normal development in *Phyllophaga* larvae, the intermediate host. It is concluded that birds feeding on pasture grazed by pigs may disseminate the eggs of the parasite over a wide area.—A. L. WILSON.

DISEASES, GENERAL

LAMONT, H. G. (1938). **The Problems of the Practitioner in Connection with the Differential Diagnosis and Treatment of Diseases of Young Pigs.**—*Vet. Rec.* **50.** 1377–1390. Discussion pp. 1391–1400.

This paper provides a valuable discussion of many of the diseases of young pigs, but is especially important in that it includes details of experiments which helped to elucidate the nature of the influenzal condition affecting young pigs in Northern Ireland. The disease could readily be transmitted by contact or by nasal instillation of a muslin filtrate of affected lung. A milder condition could be set up by instillation of a Berkefeld or Seitz filtrate together with a small Gram-negative bacillus believed to be *Haemophilus influenzae suis*. Definite lesions could be set up by instilling the organism alone, or, in some cases, by instilling a bacteria-free lung filtrate alone.

The general features of this piglet influenza, which is described as the commonest and most serious pig disease, are discussed, and control measures are advocated which are based largely upon the observations of WALDMANN & RADTKE [*V. B.* **8.** 90]. The differential diagnosis from swine fever is described, and it is stated that there had been no confirmed outbreak of S.F. in Northern Ireland for over two years. L. is satisfied that the disease occurs in Scotland, and considers it to have been a complication in the anaemia experiments of MCGOWAN & CRICHTON (1924).

In the ensuing discussion, several speakers testified to the widespread occurrence in England of a condition bearing close clinical resemblance to piglet influenza, but it was suggested that a pneumonia associated with paratyphoid infection was the commonest disease of pigs.—ALASTAIR N. WORDEN.

*REINBOTH, W. W. (1940). Ueber das Wesen und Bekämpfung der Ferkelgrippe und der Schnüffelkrankheit der Schweine. (Nach Beobachtungen aus der Praxis). [**The Nature and Control of Piglet Influenza and Chronic Rhinitis**].—*Inaug. Diss., Leipzig.* [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 200].

R. considers that deforming rhinitis of young pigs is merely a sequel of piglet influenza limited to the upper respiratory tract. Attempts to control it by biological products were unsuccessful. Attention to faults in hygiene prevents

the onset of influenza in piglets and this nasal disease is therefore controlled at the same time. It has been considered that this rhinitis is related to inheritance. Attention to the selection of animals used for breeding should also be given consideration.

STUBBS, E. L. (1941). **The Importance of Pathological Study in Poultry Diseases.** —*Poult. Sci.* **20.** 66–68.

A general discussion.—F. D. ASPLIN.

*STENIUS, P. J. (1940). **Liver and Brain Disease of Horses.**—*Suom. Eläinlääkäril.* **46.** 133–154. [Abst. from abst. in *Wien. tierärztl. Mschr.* **28.** 72–73].

Illness in horses spoken of as "liver and brain" disease caused great losses in Finland in 1935. Clinically it resembled equine encephalomyelitis. Three detailed P.M. examinations and examinations of the organs of 36 dead horses were carried out at the State veterinary laboratory and a few unsuccessful attempts were made to transmit the disease to a horse and to rabbits and g. pigs. Bacteriological investigations gave negative results.

The most extensive histological changes were seen in the liver. There was a centrolobular and peripheral degeneration of liver cells, bile pigments were present between the cells, and there was a biliary and blood congestion. There was degeneration of the Langerhans islets of the pancreas and a severe necrotic process in the kidney tubules, but the glomeruli were only slightly inflamed. The heart and body muscles showed slight fatty degeneration, whilst the brain and spinal cord were hyperaemic.

The disease appeared again in 1940.

ALBISTON, H. E., BULL, L. B., DICK, A. T., & KEAST, J. C. (1940). **A Preliminary Note on the Aetiology of Enzootic Jaundice, Toxaemic Jaundice, or "Yellows", of Sheep in Australia.**—*Aust. vet. J.* **16.** 233–243.

This article presents a progress report of investigations on this condition, which occurs almost exclusively in British breeds of sheep or their crosses, being seldom seen in Merinos. As it bears certain resemblances to copper poisoning, this possibility was investigated biochemically.

The average values for Cu in the livers of normal sheep from non-affected areas were somewhat lower than those in the livers of apparently normal sheep on affected areas. In both areas the values fluctuated with the season. Much higher liver Cu values (average 1,600 p.p.m.) were obtained from sheep which died of the disease than from healthy sheep (averages 216–711 p.p.m.). In six sheep which developed the disease, the Cu content of the blood rose just before, or coincident with, the onset of jaundice. There seems no doubt that the jaundice is haemolytic in origin. The rise in the blood Cu appears to be the cause and not the result of r.b.c. destruction. The reasons for storage of relatively large amounts of Cu in the liver are not obvious at present.

It is concluded that the disease is due to disturbance of Cu metabolism, associated with high storage values for Cu in the liver and a sudden mobilization of Cu into the bloodstream. Although essentially the same as Cu poisoning, the disease is not due to the intake of excessive Cu from the usual recognized sources.—W. I. B. BEVERIDGE.

EDGAR, G., HINDMARSH, W. L., KEAST, J. C., & ROSE, A. L. (1941). **Distribution and Incidence of Enzootic Jaundice in South Eastern Australia with Special Reference to New South Wales.**—*Aust. vet. J.* **17.** 120–129.

This paper summarizes available information regarding the symptoms, P.M. appearances, and incidence of the disease. It is based on reports of outbreaks from over 150 properties since the first record of the disease in 1926.

From this survey it is concluded that the factors associated with enzootic jaundice are common to the states of both New South Wales and Victoria. The seasonal incidence considered in relation to the rainfall, state of the pastures etc. does not permit any definite conclusions to be drawn and the onset of the disease cannot be anticipated.

There is a definite breed susceptibility, the disease being rarely seen in Merinos whilst British breeds and their crosses are most susceptible, particularly as age increases.

Although enzootic jaundice has been shown to be essentially the same as copper poisoning, there appears to be no direct correlation between outbreaks of the disease and the discriminate use of copper compounds for the control of liver flukes, foot rot, or intestinal parasites. This suggests that the copper available to the sheep is obtained largely, if not entirely, from the pasturage during grazing.—H. B. CARTER.

LÁSZLÓ, F. (1941). Zur Hämatomkrankheit des Rindes. **[Haematomas in Cattle].** —*Dtsch. tierärztl. Wschr.* **49.** 244–245.

This is a case record of a condition which was characterized by haematomas in most tissues of the body. It was spontaneous in occurrence and was not associated with other disease. L. considered it was due to vitamin C deficiency. The haemorrhages were not petechial in nature.—C. W. OTTAWAY.

SCHOFIELD, E. (1941). **Non-specific Hemoglobinuria and Acute Pulmonary Emphysema of Cattle as Essential Enterotoxemias.**—*J. Amer. vet. med. Ass.* **99.** 28–32.

S. discusses circumstantial evidence for the possibility that a haemolytic enterotoxin, possibly *Clostridium welchii* toxin, is the agent directly responsible for the destruction of the red blood cells in bovine haemoglobinuria. No conclusions have been reached. A low inorganic P level in the blood is commonly, but not always, present in affected animals, and S. regards this as an important predisposing cause.

Acute pulmonary emphysema occurs under the same conditions as favour haemoglobinuria, *i.e.*, pasturing cattle on kale and rape. Animals of any age may be affected. The disease is commonly rapid in onset, and haemoglobinuria may occur at the same time. Severe dyspnoea is the most pronounced symptom. P.M. examination shows widespread interstitial emphysema in the lungs, and pale kidneys. Scattered areas of inflammation and submucosal haemorrhages may be present in the omasum and small intestine. The liver is pale and friable and histologically shows widespread cloudy swelling and areas of necrosis. Although little is known of the disease, S. suggests that it is the manifestation of a primary toxaemia. No evidence is given to support this view.

—N. J. SCORGIE.

LONGLEY, E. O. (1940). **Contagious Pleuro-Pneumonia of Goats.**—*Indian J. vet. Sci.* **10.** 127–197. 1 appendix.

L. describes a form of caprine pneumonia which occurs in Madras. The disease appears to be related to one described by ORR [*V. B.* **9.** 440.] in the Malay States. [See also *V. B.* **9.** 333.] The incubation period averages 12–15 days and the course of the illness one week. Along with pleuro-pneumonia there is marked effusion, the exudate clotting rapidly. The lesions tend to be unilateral, the right lung being chiefly affected. The pneumonic process commonly originates in the diaphragmatic lobe. The lesions are either focal or diffuse, in the latter with intense alveolar oedema and considerable septal infiltration. In late lesions, sequestration occurs and occasionally marbling.

The disease was not transmitted by contact. Experimental transmission with a Tyrode (pH 7·4) extract of diseased lung given intratracheally, intravenously, or intrathoracically (1–5 c.c.) failed. 75% of goats inoculated subcutaneously developed an intense local oedema, death occurring in 3–8 days.

Sheep were highly susceptible to subcutaneous inoculation, but buffaloes, cattle, rabbits, g. pigs, and mice were all refractory.

Repeated attempts to isolate an infective organism failed and the existence of a virus was assumed. In one out of two attempts, the infective agent passed a Seitz E.K. filter. The virus was unusually fragile and lost virulence at 5°C. in 96 hours. Suspended in equal parts of Tyrode solution or glycerin it lost infectivity in seven days. It was killed at 55°–60°C. in 40 min. The virus was carried to the third passage by subinoculation of exudate.

The most certain method of infection in goats was by intranasal insufflation of pleural effusion with an atomiser spray. A formolized vaccine (1 : 1 Tyrode lung effusion emulsion formolized at 0·25% and stored for 48 hours at 5°C.) given subcutaneously in 10 c.c. dosage afforded an immunity in 83% of the goats tested by insufflation 14 days later. A phenolized (5%) vaccine protected five out of seven goats. In tests in which pneumonic lung effusion suspended in Tyrode was used as a vaccine and inoculated subcutaneously under the ear, reactions were mild and immunity was established in 14 days; the morbidity rate was 5·4% as compared with 75% in unprotected controls. [No data are given as to the duration of immunity.]

The morphology of the aetiological agent has been studied and the dark-ground illustrations represent growth phases which L. regards as similar to those of the bovine contagious pleuro-pneumonia organism. The name *Borrelomyces peripneumoniae capri* is, therefore, proposed for the organism. Attempts at its cultivation in artificial media were inconclusive. Some evidence was obtained to show that the

organism could be passaged in eggs. [The feeble powers of survival of the organism, the failure to propagate it on artificial media, and the unconvincing dark-ground illustrations raise a doubt as to the suitability of the name proposed for the organism.]—J. F. SHIRLAW.

ROSE, A. L. (1941). **Does Periodic Ophthalmia of Horses Occur in Australia?** —*Aust. vet. J.* **17.** 19–20.

Periodic ophthalmia has not hitherto been recorded in Australia. R. refers to several outbreaks which he considers were probably periodic ophthalmia, and very briefly describes the clinical features.—W. I. B. BEVERIDDE.

CINOTTI, F. (1939). Della navicolite cronica negli equini. **[Navicular Disease].**—*Clin. vet., Milano.* **62.** 519–543. [German summary].

This is a general clinical lecture on navicular disease, in horses, mules, and asses. No new scientific facts are included.—J. E.

GREEN, R. G. (1941). **The Problem of Encephalitis in Dogs.**—*J. Amer. vet. med. Ass.* **99.** 45–48.

G. described three types of encephalitis occurring in dogs. One of the common forms is that caused by distemper virus, which has been decisively shown to produce specific destruction in the central nervous system. Negri-like cytoplasmic cell inclusions are present in the nerve cells of the brain and also in the mucosal epithelium of the respiratory tract, gastro-intestinal tract, biliary system, and the urogenital system.

A second type of infectious encephalitis which probably occurs in dogs is that produced by the fox encephalitis virus. Here inclusion bodies are intranuclear and found only in the endothelial cells lining the capillary network of the brain.

A third type of encephalitis, due to a filtrable virus, is characterized by round-cell perivascular infiltration and gliosis in the brain. No inclusion bodies have been described. G. briefly refers to an encephalitis caused by a toxoplasm, and encephalitis associated with vitamin deficiency, possibly B_1.—N. J. SCORGIE.

CUILLÉ, J., & CHELLE, P. L. (1939). Transmission expérimentale de la tremblante à la chèvre. **[Experimental Transmission of Scrapie to Goats].**—*C. R. Acad. Sci., Paris.* **208.** 1058–1060.

A she-goat and a castrated male, aged respectively two years and six months, were inoculated into the anterior chamber of the eye with 3 c.c. of a thick suspension of bone marrow taken from a sheep in the last stages of the disease. The two animals were then kept free from contact with other affected animals. From 25–26 months after the inoculation, the first symptoms appeared, *viz*, restlessness and fright. Later a progressive paralysis developed. There was no skin irritation.

LALONDE, L. M. (1940). **A New Type of Bovine Agnathia.**—*J. Hered.* **31.** 80–81.

A short note describing a case of lethal agnathia in an Ayrshire calf. The lower jaw was rudimentary; molars and incisors were well formed and apparently about to erupt. The tongue was rudimentary, being only about 5 cm. long. No history was available for the case and the genetics of the abnormality could not, therefore, be determined.—N. J. SCORGIE.

OLIVER, J., BLOOM, F., & MACDOWELL, M. (1941). **Structural and Functional Transformations in the Tubular Epithelium of the Dog's Kidney in Chronic Bright's Disease and their Relation to Mechanisms of Renal Compensation and Failure.**—*J. exp. Med.* **73.** 141–160.

By means of three technical procedures, *viz*, vital staining, mitochondrial staining, and microdissection, structural and functional changes in the tubular epithelium of dogs with chronic interstitial nephritis were observed. All epithelial changes, indicating regressive stages of degeneration or progressive stages of hypertrophy, were identified. Functional changes were noted by the ability of the cells to absorb trypanblue injected before death. The reaction of the proximal convoluted tubule to trypanblue may be similar to its reaction to other substances and this dysfunction may play an important part in the progress of nephritis. —C. W. OTTAWAY.

LEV, M., NEUWELT, F., & NECHELES, H. (1941). **Congenital Defect of the Interventricular Septum, Aortic Regurgitation and Probable Heart Block in a Dog.** —*Amer. J. vet. Res.* **2.** 91–94.

The defect described consisted in an orifice in the interventricular septum in the pars membranacea immediately below the commissure between the right and the posterior aortic cusps. The adjacent portions of the cusps were pulled downward by the thickened

edges of the orifice, which had resulted in the clinical finding of aortic regurgitation. A histological study also revealed degenerative and fibrotic changes in the bundle of His, which were indicative of complete heart block and possibly accounted for the abnormally slow pulse rate (36 per min.). Other P.M. findings were chronic passive hyperaemia of the liver and spleen, acute hepatitis, and chronic pyelonephritis. These changes and the possible genesis of the defect in the interventricular septum are discussed.—N. J. SCORGIE.

*STORTI, E., & BROTTO, M. (1939–40). Ueber die Pathogenese der übertragbaren Hühnerleukämie. [**Pathogenesis of Transmissible Fowl Leucaemia**].—*Folia haemat., Lpz.* **63.** 1–33. [Abst. from abst. in *Wien. tierärztl. Mschr.* **28.** 73].

From their research, the authors conclude that the virus leaves the blood soon after inoculation, enters the bone marrow where it stays for about three days, and then reappears in the blood. The bone marrow is the first localization site of the virus and the first leucaemic cells originate in that tissue. Leucaemic tissues in other organs occur by dissemination of leucaemic bone-marrow cells.

The virus possesses a great and perhaps exclusive affinity for the erythroblastic cells of the bone marrow.

The disease is regarded as a neoplastic process.

BRANDT, A. J. (1940). Ueber Hypophysenadenome bei Hund und Pferd. [**Pituitary Adenoma in the Dog and Horse**].—*Skand. VetTidskr.* **30.** 875–917. [In German: English summary]. [Abst. from English summary].

The anatomy and histology of hypophyseal adenomas in man are discussed and a review is given of the relatively rare accounts in the literature of the occurrence of these tumours in domestic animals.

Normal hypophyses in dogs and horses were studied histologically and a description, illustrated by photomicrographs, is given. Ten cases of hypophyseal adenomas were investigated, five in dogs and five in horses; those of the dogs were exclusively adenomas of the anterior pituitary and those of the horses were adenomas of the pars intermedia. No purely acidophile adenoma was found and it appears that this type of adenoma rarely occurs in dogs and horses. B. remarks that breed and sex do not appear to be connected with the occurrence of the tumours, but that the age of the animal does have some bearing on it [although the number of cases investigated would appear to be too small to draw definite conclusions]. In some cases adenomas have occurred simultaneously with symptoms of other disorders, *e.g.* diabetes insipidus and dystrophia adiposa genitalis. In two cases of chromophobic cell adenomas in the anterior lobes in dogs, foci-like dystrophic calcifications were observed in the skeletal musculature and in the lungs, but it is not known whether there is any aetiological connexion between the dystrophic calcifications and the adenomas.

WRIGHT, A. W., KLINCK, G. H. Jr., & WOLFE, J. M. (1940). **The Pathology and Pathogenesis of Mammary Tumours Occurring Spontaneously in the Albany Strain of Rats.**—*Amer. J. Path.* **16.** 817–834.

Spontaneous mammary tumours occur in rats from time to time, but it is rare to find them in large numbers. The authors have studied 149 such tumours occurring on 141 females in a strain of inbred Albany rats. Only one of these tumours could be classed as a carcinoma, the remainder being fibromas (10), adenomas (11), cystadenomas (5), and adenofibromas (122). The typical histology of the tumours is described. The benign adenofibromas were not rendered malignant by prolonged oestrin injection nor could oestrin be demonstrated by bio-assay in the naturally occurring tumours. The authors believe that hyperoestrinism is not the sole cause of spontaneous mammary tumours.—J. S. P.

LEWISOHN, R., LEUCHTENBERGER, C., LEUCHTENBERGER, R., & LASZLO, D. (1941). **The Treatment of Spontaneous Breast Adenocarcinomas in Mice with Extracts of Spleen or Yeast.**—*Amer. J. Path.* **17.** 251–260.

It is claimed that, among 189 mice with mammary adenocarcinoma, 38 complete regressions have been obtained by treatment with extracts of mouse spleen or yeast. Details are given of the preparation of the extracts used, and a few of the cases are illustrated. The original diagnoses were confirmed by biopsy.

—ALASTAIR N. WORDEN.

NUTRITIONAL AND METABOLIC DISORDERS

—. (1941). **"Straight Steely Wool" and Incipient Copper and Cobalt Deficiency in South Australia.**—*J. Dep. Agric. S. Aust.* **44.** 299–303.

The most strikingly obvious symptom of experimental Cu deficiency in sheep is a progressive change in the fleece from the normal wool to the straight, glistening, lustrous wool known to the local wool trade as "steely wool". This provided a clue which led on further investigation to confirmation of the fact that sheep pastured over extensive areas of South Australia may suffer from periodical Cu deficiency. There is a strong implication that most of the areas concerned are also deficient in Co. Such areas are borderline deficiency areas for these two elements, and are outside the more obviously "coasty" country.

The trouble may be overcome by providing Cu and Co supplements, and on most areas where sheep will take salt these elements are best administered as a lick.—H. B. CARTER.

PHILP, R. C. T., DUMARESQ, J. A., & WILSON, R. J. (1940). **"Coasty Disease" Trials, King Island, 1939-40.**—*Tasm. J. Agric.* **11.** 187–192.

These observations suggest that "coasty disease" on King Island is a dual deficiency of cobalt and copper. Experiments showed that ½ fl. oz. of a solution containing 0·05% $CuSO_4$ and 0·05% $CoSO_4$ administered twice weekly rapidly cured "coasty" sheep. Co alone, while it kept "coasty" sheep alive, did not lead to full recovery. An experiment also demonstrated that sheep could be maintained in perfect health on "coasty" country either by topdressing with 20 lb. $CuSO_4$ and 2 lb. crude $CoSO_4$ per acre or by providing a lick consisting of equal parts of bone meal and salt plus 2½ oz. $CuSO_4$ and ½ oz. $CoSO_4$ per cwt.

—H. B. CARTER.

MCNAUGHT, K. J., & PAUL, G. W. (1940). **A Case of Cobalt Deficiency on Limestone Soil.**—*N.Z. J. Sci. Tech.* **21.** 343A–344A. [Authors' summary copied *verbatim*].

A localized case of cobalt deficiency affecting both cattle and sheep has been observed on a highly calcareous soil in the Wairarapa. Analyses of soil and pastures show low cobalt figures. Cobaltized salt lick has been successfully used to combat the ailment.

DIXON, J. K., & KIDSON, E. B. (1940). **The Influence of Southland Limestones on the Cobalt Content of Pasture at Morton Mains.**—*N.Z. J. Sci. Tech.* **22.** 1A–6A.

Southland limestones contain a small but significant amount of Co which is available to the pasture when the limestone is used as a topdressing. Lambs feeding on this pasture absorb some of the Co, as is indicated by the increased Co content of their livers.—M. B. B.

SHEEHY, E. J., & BURKE, E. M. (1940). **The Effect of Fibre and "Bulk" in the Dietary on the Progress of Chickens and on the Prevention of Feather Picking and Cannibalism.**—*J. Dep. Agric. Eire.* **37.** 42–70.

The effect of varying the physical constitution of the diet was studied in a series of 11 experiments with White Wyandotte chicks, which had been reared indoors on all-mash dietary. In most of the experiments, variously treated cereal products were compared, and the discussion of the results occupies many pages of text.

"Bulk", which is influenced by fibre content and by the constituent water of the foodstuffs, does not itself appear to be of great importance in chick nutrition, there being no difference between the nutritive value of flaked maize or flaked bran and that of maize meal or ground bran respectively. Fibre content, however, appears to be of great significance, and may limit growth if it is excessive. About 5% fibre is advocated for rapid fattening, and about 6% for satisfactory development subsequent to the chick stage.

Feather-picking appears to be prevented most effectively by the incorporation in the diet of wheat bran. Other foods, including oat hulls, lawn clippings, mangels, and molassed beet pulp also counteract feather-picking, but in the case of the mangels and beet pulp the amounts which have to be fed are so great that they hinder normal growth. In birds in which feather-picking has been inhibited, the droppings are moist and bulky, and indicative of a properly functioning lower gut.

Physical inadequacies in the diet are, of course, largely overcome if the birds are provided with adequate litter or have access to pasture.—ALASTAIR N. WORDEN.

NI, T. G. (1940). **Nutritional Encephalo-**

malacia and some Factors Accelerating its Onset.—*Chin. J. Physiol.* **15.** 181–188. [In English: Chinese summary].

The author has previously (1937–38) reported that nutritional encephalomalacia in chicks may be prevented by the addition to the diet of the Chinese gelatin *Ah-chiao*. In the present paper it is stated that fractions obtained from the gelatin by extraction with alcohol, ether, or petroleum ether actually accelerated the onset of symptoms. Replacement of the cod liver oil in the basal diet by halibut liver oil, or by 30 μg. per head daily of carotene, plus a vitamin D preparation, also appeared to hasten the onset of the disease.—ALASTAIR N. WORDEN.

WIESE, A. C., BENHAM, G. H., ELVEHEM, C. A., & HART, E. B. (1941). **Further Bone Phosphatase Studies in Chick Perosis.**—*Poult. Sci.* **20.** 255–258.

A report is made on the distribution of phosphatase activity in the leg bones of perotic and normal chicks. Maximum activity was found in the extreme ends of the bones, the shafts being very poor. The proximal end of a bone had a higher phosphatase activity than the distal end of the same bone. The right and left halves of any bone had approximately equal phosphatase content. The bone phosphatase activity in chicks receiving adequate manganese was much higher than in Mn-deficient chicks. The authors consider that the increase in phosphatase activity is due to an increase in the amount of the enzyme rather than to an activation of the enzyme by the Mn ion.

—F. D. ASPLIN.

JUKES, T. H. (1941). **Studies of Perosis in Turkeys. I. Experiments Related to Choline.**—*Poult. Sci.* **20.** 251–254.

Experiments are described in which various substances and foods were incorporated in a diet designed to produce perosis in young poults. Groups of 12–15 birds were used. It is concluded that choline and lecithin prepared from egg-yolk in a diet containing adequate manganese will promote growth and prevent perosis. Methionine, inositol, and creatine did not prevent perosis, and maize and wheat accelerated the development of the disease. Soya-bean meal and sardine meal were a good source of the anti-perotic factor and contained an unidentified growth-promoting factor which was also supplied by cottonseed meal, wheat, and barley.—F. D. ASPLIN.

HOLMES, C. E., HALPIN, J. G., & HERRICK, C. A. (1941). **Rickets in Laying Pullets Fed Sulphur.**—*Poult. Sci.* **20.** 46–50.

The effect is reported of feeding flowers of sulphur and ground sulphur at levels of 2 and 5% in a diet containing 1% cod liver oil (85 A.O.A.C. units of vitamin D per g.).

Groups of 20 pullets confined behind closed glass windows during the winter months were trap-nested and their egg production and the hatchability of fertile eggs recorded. The birds developed symptoms typical of vitamin D deficiency. Egg production and hatchability were much lower in the sulphur-fed groups than in the control groups. Rapid improvement took place when the windows were opened to admit direct sunlight or when the sulphur was omitted from the diet. It is concluded that it is unsafe to feed sulphur to pullets that do not have access to direct sunlight even although the usual amount of cod liver oil is fed.—F. D. A.

CORRELL, J. T. (1941). **The Biologic Response of Chickens to Certain Organic Acids and Salts with Particular Reference to their Effect on Ossification.**—*J. Nutrit.* **21.** 515–525.

It was not found possible to prevent the development of rickets in chicks by the addition of organic acids, or of the Na or K salts of such acids, to the basal rachitogenic diet. [In the case of rats, HAMILTON & DEWAR (1937) claimed that rickets may be prevented by the addition to the basal diet of citric or tartaric acids, or of their Na salts.]

Most of the "cationogens" employed were found to be toxic, and deposits of "salt" were laid down in the pericardium, kidneys, and joint cavities of birds which were fed a mixture of citric acid and sodium citrate. The nature of these deposits was not established, but they occurred to a lesser degree in birds receiving a mixture of acetic acid and sodium acetate. Potassium citrate was not found to be very toxic.

A mixture of ammonium carbonate and ammonium chloride did not prove to be rachitogenic, as has been claimed in the case of rats.—ALASTAIR N. WORDEN.

SHOHL, A. T., & FARBER, S. (1941). **Effect of A.T.10 (Dihydrotachysterol) on Rickets in Rats Produced by High-Calcium-Low-Phosphorus Diets.**—*J. Nutrit.* **21.** 147–154.

The oxidation product of ergosterol termed A.T.10 was found, when administered in very

high dosages, to protect young rats against the rachitogenic action of a high Ca, low P diet. The protective dose of A.T.10 (25μg.) was only one-fifth of the amount capable of setting up toxic symptoms.—ALASTAIR N. WORDEN.

DAVIES, A. W., & MOORE, T. (1941). **Interaction of Vitamins A and E.**—*Nature, Lond.* **147.** 794–796.

Under suitable conditions, deficiency of vitamin E may lead to acute secondary deficiency of vitamin A. Young rats which had previously received diets rich in vitamin A were divided into two groups. One group was given a basal diet deficient in vitamins A and E, while the second group was given the same basal diet together with 1 mg. weekly of synthetic vitamin E (*dl*-α-tocopherol acetate). The results showed that in animals restricted to the diet deficient in both vitamins, the vitamin A reserves were used up much more rapidly than in the group receiving the vitamin E supplement. The teeth of the animals which had received tocopherol remained normal throughout, whereas those of the E-deficient group became "white"; such whitening has previously been considered to be the result of a vitamin A deficiency.

The authors, who have previously established that a gross vitamin B deficiency does not reduce the vitamin A reserves, suggest that the tocopherols, as higher and more hydroxylated members of the series to which hydroquinone belongs, may act as stabilizers of vitamin A under physiological conditions.—A. N. W.

DAVIS, R. E., & MADSEN, L. L. (1941). **Carotene and Vitamin A in Cattle Blood Plasma with Observations on Reproductive Performance at Restricted Levels of Carotene Intake.**—*J. Nutrit.* **21.** 135–146.

Methods are described for the estimation of carotene and vitamin A in plasma or serum. Experiments on Hereford and Shorthorn heifers receiving graded amounts of carotene and on normal Shorthorn cows at pasture showed that the plasma levels of both carotene and vitamin A were dependent upon carotene intake and upon previous storage. Even with a high (pasture) intake of carotene, however, the average plasma vitamin A content did not exceed 40–65 μg. per 100 ml. In the case of plasma carotene, very high levels could be induced, the average figure for 11 animals at pasture being 813 μg. per 100 ml.

Three heifers receiving 30–45 μg. of carotene per kg. body weight produced calves that were either blind and weak or dead at birth, while heifers on higher carotene intakes had normal calves.—ALASTAIR N. WORDEN.

THORP, W. T. S., RUDY, W. J., & BOUCHER, R. V. (1940). **A Nonspecific Lesion of the Esophagus and Oral Cavity of the Chicken.**—*Amer. J. vet. Res.* **1.** 78–81.

The lesions encountered and described resembled those met with in cases of vitamin A deficiency. Twenty-five cases were studied and the incidence was not significantly different in groups of hens on diets high or low in vitamin A content or in groups on diets high or low in riboflavin.

Such bacteriological examinations as were made indicated that the organisms found in the lesions were not of aetiological significance. The authors state that caution should be exercised in making a diagnosis so that the condition described is not confused with vitamin A deficiency.—W. J. IRONSIDE.

BAUMANN, C. A., FOSTER, E. G., & LAVIK, P. S. (1941). **The Effect of Certain Carcinogens on Vitamin A in the Liver.**—*J. Nutrit.* **21.** 431–444.

Colloidal suspensions of certain carcinogenic substances were found, when injected intraperitoneally, to reduce the liver vitamin A reserves of young rats below those of non-injected controls receiving the same diet. Dibenzanthracene was the most potent of the substances tested, reducing the vitamin A reserves to a much greater extent than did the more powerfully carcinogenic methyl cholanthrene and benzpyrene. 1,2-benzanthracene (non-carcinogenic) also reduced the liver reserves, whereas dimethyl-aminoazobenzene ("butter yellow", carcinogenic) and carbon black (non-carcinogenic) were without effect. There seemed, therefore, to be no direct relationship between carcinogenic potency and effect upon vitamin A.

In further experiments, it was shown that clinical symptoms of vitamin A deficiency could be accelerated by the injection of dibenzanthracene. The livers of rats with spontaneous tumours appeared, however, to be slightly higher in vitamin content than did those of normal stock rats.—ALASTAIR N. WORDEN.

SCHUMACHER, A. E., & HEUSER, G. F. (1941). **Isolation of an Organism Responsible for the Increased Riboflavin Content of**

the Feces of the Fowl.—*Poult. Sci.* **20.** 272–277.

The isolation of an organism capable of synthesizing riboflavin in hens' faeces is described. Maximum riboflavin production takes place at a temperature of 20°–22°C. The riboflavin content, measured by the fluorometric method, was increased 100–300% in a period of 6–7 days. The organism did not produce an increase in the riboflavin content of a watery extract of faeces. It has been obtained in pure culture and appears to belong to the genus *Bacillus*.—F. D. ASPLIN.

STREET, H. R., COWGILL, G. R., & ZIMMERMAN, H. M. (1941). **Some Observations of Vitamin B_6 Deficiency in the Dog.**—*J. Nutrit.* **21.** 275–290.

Four adult mongrel dogs were provided with a synthetic diet deficient in vitamin B_6. One animal died after 199 days, while the remainder received occasional injections of crystalline vitamin B_6 in order to secure remission of symptoms, and survived for periods of 317–436 days. The symptoms and lesions noted were loss of weight, intermittent diarrhoea and occasional blood-stained faeces, abnormalities of the gait, hypochromic microcytic anaemia, clinical and pathological evidence of cardiac embarrassment, some diminution in gastric HCl (not a true achlorhydria), and myelin degeneration of the sciatic nerves and of the posterior columns of the spinal cord.

Controls receiving crystalline vitamin B_6 remained in normal health and showed no abnormal P.M. findings apart from slight myelin degeneration of the peripheral nerves. After 348 days, the vitamin B_6 supplement was withdrawn from the diet of one of the control animals which shortly afterwards exhibited symptoms of minor epileptiform seizures and within a few weeks developed a marked ascites. P.M. examination revealed a chronic passive congestion of the liver.—ALASTAIR N. WORDEN.

PEARSON, P. B., WINEGAR, A. H., & SCHMIDT, H. (1940). **Studies on the Metabolism of Nicotinic Acid in the Sheep.**—*J. Nutrit.* **20.** 551–563.

Seven young lambs failed to thrive when provided with a nicotinic acid diet similar to that used in a previous study [see *V. B.* **8.** 614.] and estimated photometrically to contain 0·6 mg. nicotinic acid per 100 g. Two lambs died early in the experiment, while the growth of the remaining five was extremely poor. The addition of 10 g. yeast per day to the diet of one animal was without effect. The nicotinic acid content of the blood and urine were, however, of the same order as that in normal lambs, and the authors suggest that it is the unpalatable nature of the diet, rather than any vitamin B deficiency, which was responsible for the poor results. Dogs which were fed on a similar diet minus the cellulose developed blacktongue and showed marked falls in urinary nicotinic acid excretion.

After the administration of massive doses (8–10 g.) of nicotinic acid to normal lambs, percentage recoveries of nicotinic acid varying from 42–92 were made from the urine, and the blood and liver values were considerably augmented.—ALASTAIR N. WORDEN.

MACKENZIE, C. G., MACKENZIE, J. B., & MCCOLLUM, E. V. (1941). **Uncomplicated Vitamin E Deficiency in the Rabbit and its Relation to the Toxicity of Cod Liver Oil.**—*J. Nutrit.* **21.** 225–234.

Young rabbits which were provided with a diet consisting of defatted casein, dextrin, yeast, carotene, vitamin D, and mineral mixture grew fairly well for about three weeks and then developed symptoms of acute muscular dystrophy. Histological examination of affected muscles showed marked degenerative changes. Control animals which received orally 3 mg. daily of synthetic α-tocopherol remained clinically normal and free from histological lesions, but this protective effect could be abolished by administering as little as 1 ml. of cod liver oil within a few minutes of giving the vitamin E. The addition of 2 ml. of cod liver oil to the daily ration also inhibited the curative effect, but the addition of 8% fresh lard did not influence the action of the vitamin E.—ALASTAIR N. WORDEN.

PHYSIOLOGY

CRAIGE, A. H., Jr., & GADD, J. D. (1941). **The Determination and Clinical Correlation of Variations in the Calcium, Inorganic Phosphorus, and Serum Proteins of Horse Blood.**—*Amer. J. vet. Res.* **2.** 227–256.

From 330 horses 410 blood samples were obtained and determinations of calcium, phos-

phorus, and protein were made. The results were examined with respect to the effects of age, sex, season of the year, feeding, pregnancy, and clinical condition of the animals.

Total serum Ca ranged from 11–13·5 mg. per 100 c.c. (mean 12·2 mg., standard deviation 0·5); serum inorganic P varied from 2–8 mg. per 100 c.c.; total serum proteins from 5–7 g. per 100 c.c. (mean 6·1 g., standard deviation 0·3). It was found that the serum Ca varied with seasonal change and differences in feeding; age and sex were without influence. Pregnant mares showed a tendency towards a reduction in total Ca, this being more obvious in the later stages of pregnancy. Age was the most important factor in determining the level of inorganic P, maximum values being found in foals and minimum values in adult animals. A seasonal tide in inorganic P was also observed, but differences due to sex, pregnancy, and feeding were without significance. The protein level varied with age, pregnancy, and season, sex and differences in feeding being without effect; the protein changes were largely in the globulin fraction. The authors correlated their analytical findings with the clinical conditions of the animals and found that in cases with acute bone lesions there was a marked reduction in blood Ca and P. In subacute cases this reduction in blood Ca and P was less pronounced, while chronic bone lesions gave normal blood values. From a study of clinical subjects with diseases of the soft tissues, a distinct tendency towards hypocalcaemia was observed in respiratory cases, and diarrhoea was associated with a marked reduction in the blood levels of both Ca and P.—F. Aylward.

McNally, E. H. (1941). **Heart Rate of the Domestic Fowl.**—*Poult. Sci.* **20.** 266–271.

Observations were made on the heart rate of White Leghorn and Rhode Island Red chickens by means of an electrocardiotachometer. The minimum heart rate was found during the early morning hours (1–3 a.m.), when as few as 160 beats per min. were recorded. Eating, movement, and excitement resulted in fluctuation of the heart rate.

Both breed and sex were found to be associated with difference in the heart rate. The author considers that the correlation between body weight and heart rate is more fundamental. A small White Leghorn hen had the highest average recorded rate of 396 per min. and a large R.I.R. male had the lowest of 192 per min. The average of all birds recorded was 282 per min.—F. D. Asplin.

Engel, D. (1940). **The Permeability of the Synovial Membrane.**—*Quart. J. exp. Physiol.* **30.** 231–244.

E. considers it safe to assume that almost all material which reaches the joint cavity from the bloodstream has had to pass a double membrane consisting of capillary endothelium and synovial cells; this composite membrane he terms *barrière articulaire*, by analogy with the *barrière rachidienne* of the choroid plexus. The permeability of the barrier was studied in anaesthetized cats and rabbits by a technique which is fully described. Certain dyes were injected intravenously or intramuscularly, and the quantity which diffused through was determined colorimetrically in Ringer's solution perfusates of the knee joints. Not one of ten alkaline dyes was found in the perfusates, whereas 14 out of 17 acid dyes were found, in quantities which in most cases appeared to be in direct proportion to their diffusibility. Methyl orange, which is an acid dye of fairly high diffusibility, did not appear in the perfusate, but it is pointed out that this substance resembles the majority of alkaline dyes in being lipoid soluble.

Further studies were carried out with joints in which inflammation had been set up by the direct injection of Lugol's solution. Dye perfusion, including that of prontosil red, was found to be greatly diminished in such cases. Sodium salicylate was excreted freely into normal joint cavities, but does not appear to have been tested in the case of inflamed joints.

—Alastair N. Worden.

Zeldes, M. (1940). **Alveolar Lining of the Lung in Relation to the Viability of the Fetus.**—*Arch. Path.* **29.** 748–758.

The lungs of infants that were either aborted, stillborn, or died soon after birth were examined. It was found that the cells lining the alveoli of the lungs changed from the cuboidal to the flat type from the 24th–33rd week of intrauterine life. This is the period in which the previable infant becomes viable. The number of stillborn infants decreased as this transition took place and it is concluded that the type of epithelium lining the alveoli is significant in determining the viability of the infant.—A. T. Phillipson.

ZIEGLER, H. (1941). Zur baulichen Eigenart der Milchgänge. **[Structure of the Milk Ducts of the Udder]**.—*Schweiz. Arch. Tierheilk.* **83.** 47–52.

According to Z., the structure of the quarter itself plays an important part in the storage and excretion of milk. Two distinct parts of the quarter can be identified, the milk ducts, or canals, and the glandular tissue. Most of the glandular tissue is arranged in a series of ridges on the walls of the ducts and cisterns. This tissue is formed by milk cells ranged around storage acini. It is surrounded by smooth muscle and interstitial tissue continuous with the wall. Manipulation of the teat causes the muscular tissue of the quarter to contract so that milk is squeezed out of the acini into the ducts and eventually into the teat canal. The arrangement of the ducts is such that their calibre is alternatively wide then narrow, and the pressure of the milk within the udder is thus maintained. These observations were made from sagittal sections of quarters of cows which had been prepared by injection and immersion in formalin solution, and from a few microscopic sections of the walls of ducts. The figures are very instructive.—C. W. OTTAWAY.

I. VENZKE, W. G. (1940). **The Histology of the Thyroid Glands of Dogs Sixteen Weeks of Age.**—*Proc. Iowa Acad. Sci.* **46.** 439–441.

II. GILMORE, J. W., VENZKE, W. G., & FOUST, H. L. (1940). **Growth Changes in Body Organs. Part II. Growth Changes in the Thyroid of the Normal Dog.**—*Amer. J. vet. Res.* **1.** 66–72.

I. V. reviews the general anatomy of the thyroid of the dog. Microscopically, the follicles were found to vary in size from 30–160μ. Two types of cells were found in the follicular epithelium, one large with a centrally placed nucleus and the other more numerous and smaller. They probably represented stages of cellular secretion. A varying degree of colloid vacuolation was present which V. believes to be an indication of follicular activity.

II. The thyroid glands of 70 dogs selected at random were examined to determine the effect of age upon growth changes. Other factors were not considered. No definite data could be obtained to indicate a regular change in general growth, but it was noticed that there was a slight decrease in gland weight per kg. body weight in older dogs. The diameter of follicles (vesicles) was found to increase up to 16 weeks of age. The development and nature of the epithelial lining varied, although it often showed its greatest height at about 16 weeks. An attempt was made to demonstrate interfollicular tissue, but although reticular fibres were found between follicles, they were sometimes interspersed with colloid cells enclosing minute amounts of colloid. The authors assume from this that these areas are associated with the new growth of follicles and that no true basement membrane is present.—C. W. O.

RUMYANCEV, N. V. (1938). **The Influence of Total Anterior Pituitary Preparation on the Genitalia of the Cow.**—*Usp. zooteh. Nauk.* **5.** No. 2. 73–85. [In Russian: English summary]. [Abst. from abst. in *Anim. Breed. Abstrs.* **8.** 130].

Results of experiments on five herds of cattle showed that injection of extracts of fresh pituitary glands did not induce heat and had no marked effect on the duration and intensity of oestrus. In 54% of cases it induced follicular growth with subsequent ovulation, luteinization, and a considerable increase in the number of corpora lutea. The right ovary apparently functions more intensively than the left, since the ratio of occurrence of oestrus and experimental corpora lutea in the right and left ovary was 2 : 1. The results suggest that under the conditions of this experiment the oestrous corpora do not inhibit follicular growth and ovulation. Experimental corpora were usually produced 5–7 days after injection of a non-frozen pituitary extract and 11–12 days after a frozen preparation. Repeated injections produced less marked changes than a single injection.

DE WITT, J. J. D. (1940). **A Quantitative and Qualitative Test for Steroid Hormones Based on the Oviposition Reaction of the Female Bitterling (*Rhodeus amarus* Black).**—*J. Endocrinol.* **2.** 141–156.

Under natural conditions the ovipositor of *R. amarus* is lengthened only during the spawning season. It may, however, be caused to lengthen at other times by the addition to the aquarium water of suitable urinary or steroid hormone preparations. A detailed description is given of a quantitative test based on this reaction. [See also *V. B.* **10.** 715.]—A. N. W.

REIFENSTEIN, G. H., FERGUSON, J. H., & WEISKOTTEN, H. G. (1941). **Studies on Leukocytosis. I. Hourly Leukocyte Variations of Normal Rabbits. II. Neutrophilic Leukocytosis Following Intravenous Injection of Supernatant Fluid from a Sterile Exudate (Rabbit).**—*Amer. J. Path.* **17.** 219–231 and 233–250.

I. The hourly total and differential leucocyte changes in 14 rabbits were studied. There were considerable variations in the counts of different animals, but when mean values were examined, the total leucocyte count showed little variation. There was a tendency for the lymphocytes to decrease and the neutrophiles (amphophiles) to increase during the day.

II. Sterile peritoneal exudates were obtained 5¾–12 hours after the intraperitoneal injection into rabbits of sterile physiological saline. The exudates were centrifuged and the supernatant fluid was obtained. 5 c.c. of this fluid were injected into each of five rabbits, and two doses of 5 c.c. were injected into each of four rabbits (interval between injections 58–106 days). Hourly leucocyte counts carried out on the rabbits showed a neutrophilic leucocytosis a few hours after each injection, the peak being reached within 2–3 hours and the normal value being reached again within 6–31 hours. Control injections of physiological saline produced no effects. It is concluded that some factor is present in the peritoneal exudates which affects the neutrophile count.—F. AYLWARD.

HASS, G., & MCDONALD, F. (1940). **Studies of Collagen. I. The Production of Collagen in Vitro under Variable Experimental Conditions.**—*Amer. J. Path.* **16.** 525–548.

HASS, G. (1940). **Studies of Collagen. II. Methods and Results of Implantation of Collagen-Forming Cultures in Granulation Tissue.**—*Ibid.* 549–560.

I. The authors studied the formation of collagen in tissue culture, using lung and spleen explants from normal adult g. pigs and rats, immersed in homologous heparinized plasma. At intervals which varied from 6–40 days, the explants were fixed, cut serially, and stained with Mallory's aniline blue collagen stain.

Collagen appeared in the region of fibroblasts within 6–8 days and increased in amount up to 14–16 days. After this time there was a tendency to a decrease in the amount of collagen, although there were many proliferating and viable fibroblasts present.

The amount of new collagen was much greater from spleen than from lung explants; this may be related to the higher content of the former in lymphocytes.

Deposition and resorption of collagen was influenced by the viability of the fibroblasts and by the pH of the medium.

There was no evidence that the amount of collagen deposited was quantitatively related to the ascorbic acid content of the medium, provided that the fibroblasts were normally viable and the pH was within the normal limits.

II. Tissue cultures similar to those used in I were transferred to metal cylinders fitted with permeable or semi-permeable membranes of cellophane and were then implanted in an incision in the subcutaneous tissue of rats and g. pigs. After periods varying from 2–18 days the cultures were removed, fixed, and serially sectioned.

The cylinder became surrounded by granulation tissue and the clot of fibrin within the cylinder became slowly absorbed, irrespective of the permeability of the membrane fitted to the cylinder. The collagen within the implanted culture appeared to be affected by two types of influence transmitted through the membrane from the granulation tissue surrounding the cylinder. One factor caused increased deposition of collagen and the other factor favoured its increased absorption. The relative predominance of these two factors varied according to whether the culture medium and host tissues were homologous or heterologous and was also affected by the permeability of the membrane. It was not found possible to segregate the two antagonistic influences on the implanted cultures.—E. G. W.

POISONS AND POISONING

MOORE, G. R. (1941). **Sodium Chlorate Poisoning in Cattle.**—*J. Amer. vet. med. Ass.* **99.** 50–52.

It has generally been considered that sodium chlorate is non-poisonous as used for the control of certain weeds, *e.g.* bindweed (*Convolvulus arvensis*), and that it can be used in fields where livestock are grazing. M.

records an instance of poisoning in cattle following the treatment of 1 acre in a 110-acre field with 1,460 lb. of this chemical. Of 40 cattle grazing in the field, 15 showed symptoms of poisoning on the day following the application; six animals died. The affected animals exhibited pronounced depression, staggering, cyanosis, haematuria, and haemoglobinuria. Drawn blood was a dark chocolate colour. All the animals salivated freely and showed profuse diarrhoea. Evidence of abdominal pain was present in most cases. The P.M. findings were consistent with the clinical symptoms. The pharmacological action of sodium chlorate is the production of methaemoglobin which results in asphyxia when absorption of the chemical is prolonged. Relatively little work has been done in determining the toxic dose for cattle and M. refers to certain factors, *e.g.* the presence of reducing bacteria, which may be capable of modifying the toxic action of the chemical.—N. J. SCORGIE.

MILLER, W. T., & WILLIAMS, K. T. (1940). **Effect of Feeding Repeated Small Doses of Selenium as Sodium Selenite to Equines.**—*J. agric. Res.* **61.** 353–368.

To study the effects of long-continued feeding of selenium in inorganic form, small daily doses varying from 17·3–115 p.p.m. were given to three horses and a mule. The mule died in 6½ months, one horse in 17 and another in 17½ months, and the third horse which received the highest level of selenium at the beginning of the experimental feeding lived only five weeks. The chief symptoms were emaciation despite good appetite, looseness of the mane and tail hairs, and softening and scaling of the horn of the hoof. None of these symptoms was as severe as those described in naturally occurring cases of "alkali disease" [see *V. B.* **6.** 616 and **9.** 898].—R. BAMFORD.

PRICE, G. T. (1941). **Beach Apple or Manzanilla Poisoning.**—*Vet. Bull. U.S. Army.* **35.** 30–32.

The beach apple (*Hippomane mancinella*) is a small tree common on the coasts of Panama, where it frequently forms dense thickets; it is seldom found more than a few hundred yards inland from the sea. Contact with the foliage or any part of the plant, even the dried wood, causes in man and animals an acute, inflammatory, cutaneous reaction, which is followed after several hours by exudation and necrosis of the skin. P. refers to two incidents in which army pack animals were affected. A prophylactic treatment after exposure, apparently long known by the local Indians, is bathing in sea water. This treatment is also effective in the initial inflammatory stage. During the exudative stage, wet magnesium sulphate dressings are beneficial; glyceride of tannic acid has also been used with satisfactory results.—N. J. S.

WINKS, W. R. (1940). **Variation of the Prussic Acid (HCN) Content of *Sorghum verticilliflorum* at Different Stages of Growth.**—*Qd agric. J.* **54.** 364–366.

S. verticilliflorum, commonly known as wild sorghum, is native to Africa, but has become naturalized on the coastal fringe of Queensland. It is dangerous to stock at all stages of growth and thus differs from the cultivated sorghums. This property is due to secondary growth springing from the nodes which may contain large quantities of HCN even during the winter.—H. B. CARTER.

LEGG, J. (1941). **Poison Plants.**—*Qd agric. J.* **55.** 11–21.

A brief summary is given of the factors which influence the toxicity of poison plants, toxic principles, symptoms and lesions, and the circumstances in which poisoning occurs in the field. The following poison plants, important to Queensland, are briefly dealt with:—*Lantana* sp., *Hoya australis* (hoya or wax flower), *Passiflora alba* (wild passion vine), *Trema aspera* (poison peach), *Verbesina encelioides* (wild sunflower), *Salvia reflexa* (wild mint), *S. coccinea* (a garden "escape"), *Threlkeldia proceriflora* (soda bush), *Wedelia asperrima* (yellow daisy), *Brachyachne convergens* (a couch grass), *Swainsona luteola* and *S. galegifolia* (darling peas), *Atalaya hemiglauca* (whitewood), and *Terminalia oblongata* (yellowwood).—H. B. CARTER.

STEWART, J. (1941). **Poison Gas on the Farm: Some Problems of the Veterinary Practitioner.**—*Vet. Rec.* **53.** 249–251.

S. classifies war gases from the veterinary practitioner's point of view into three groups:—(1) tear gas and lung irritants, (2) gases containing arsenic, and (3) mustard gas. A brief description is given of the damage likely to be suffered by farm stock, their treatment, and salvage. The effect of gas on growing crops and pasture is also referred to. The veterinary practitioner should avail himself of local anti-gas training so that he can tackle his own problems with confidence.

[The general principles of animal protection against gas are given in ARP handbook No. 12 published by H.M. Stationery Office. The Ministry of Agriculture and Fisheries (Publications Division) in their technical communication No. 4 describe the effects and treatment of crops contaminated by war gases. "Food and its protection against poison gas" also bears on this subject and is published by H.M. Stationery Office.]—R. BAMFORD.

THERAPEUTICS

NEWCOMB, & ALBERT. (1941). **Discussion on Recent Advances in Chemotherapy.**—*Aust. vet. J.* **17.** 40–43.

This reports a meeting of the Veterinary Association of New South Wales at which the history, pharmacology, and veterinary therapeutic uses of the sulphonamide drugs were mainly considered. The use of mandelic acid as a urinary antiseptic and the uses of cardiazol were also briefly discussed.—H. B. CARTER.

FONNESBECH-WULFF, K. (1940). Behandling af Bronchopneumoni hos Kalve med M & B 693. **[Treatment of Broncho-Pneumonia of Calves with M & B 693].** —*Medlemsbl. danske Dyrlaegeforen.* **23.** 60–61.

The author reports successful results in the treatment, with M & B 693 given *per os*, of broncho-pneumonia in three-month-old calves, caused by *Streptococcus pyogenes*. After many deaths from the disease, nine affected calves were treated and all recovered.—J. E.

DELAPLANE, J. P., & STUART, H. O. (1941). **The Chemotherapeutic Value of Sulfathiazole in Preventing and Treating Infectious Coryza (Hemophilus Gallinarum Infection) in Chickens.**—*J. Amer. vet. med. Ass.* **99.** 41–42.

Sulphanilamide and sulphapyridine were found to have toxic effects when administered in amounts that gave some protective but no curative value against infectious coryza in chickens, trials of sulphathiazole were carried out by adding it to the food in concentrations of 1, 0·5, and 0·25 g. per 30 g.

At a dosage rate of 2 g. daily (administered individually to birds because they would not eat the mash), badly infected cases showed marked improvement at the end of the second day. Treatment by feeding at the rate of 0·5 g. per 30 g. mash was continued for three more days and the improvement was maintained.

Birds fed on a mash containing 0·25 g. per 30 g. for two days were resistant to infection caused by inoculation of virulent cultures.

—W. J. IRONSIDE.

ROTHBARD, S., ANGEVINE, D. M., & CECIL, R. L. (1941). **The Influence of Gold Sodium Thiomalate (Myocrysin) on the Prevention of Hemolytic Streptococcus Arthritis in Rats.**—*J. Pharmacol.* **72.** 164–174.

Arthritis was produced by injecting, into the tail vein of rats, 0·5 c.c. of an 18-hour broth culture of a relatively avirulent group A streptococcus.

Myocrysin was found to be less effective than sulphanilamide and sulphathiazole in preventing the development of arthritis, and great caution was necessary in administering this substance because the effective dose was very close to the lethal dose. None of the substances cured arthritis once it had become established.

—JOHN FRANCIS.

FISK, R. T. (1941). **Therapeutic Properties of Sulfanilamide and Related Drugs in Experimental Typhoid Infection of Mice.** —*J. infect. Dis.* **68.** 20–23.

Several drugs of the sulphonamide series showed a significant therapeutic action against *Salmonella typhi* infection in mice (intraperitoneal injection with mucin). The persistence of viable organisms in the tissues of surviving animals, however, complicates the interpretation of drug assay in *S. typhi* infection.

—J. M. ROBSON.

YANAGISAWA, K., OOBAYASHI, Y., & TAKANO, M. (1940). **The Influence of Inorganic Oxidizing Chemical Compounds on Experimental Tuberculosis in Guinea Pigs.** —*Jap. J. exp. Med.* **18.** 105–116. [In English].

Studies were made of the effect of three oxidizing agents, potassium iodate, permanganate, and dichromate, upon the development of TB. in g. pigs sensitized with the human type bacillus. The oxidizing agents were injected twice a week and the g. pigs were killed off after ten weeks and the extent of the lesions in the various lymph nodes and viscera was determined and assessed on an empirical and numerical scale. Comparison was made with untreated controls and with g. pigs receiving the

non-oxidizing forms of the above chemicals, *viz*, KI, manganese chloride, and chromic sulphate, and the broad assessment of the results appeared to indicate that injection of these oxidizing agents accelerated the development of TB. This accelerated development of the disease is attributed to the oxidizing properties of these agents and not to their other properties.
—ALFRED EDEN.

KING, E. S., & LUCAS, M. (1941). **Sulfapyridine in Experimental Brucellosis.**—*J. Lab. clin. Med.* **26.** 616–621.

G. pigs were injected with *Brucella suis*, *Br. melitensis*, and *Br. abortus* and then treated with sulphapyridine orally (100–200 mg. per day), the first dose being given 1½ hours or six days after infection. The treatment produced only a slight preventive or curative effect. The data suggest that high doses of the drug may be effective against *Br. suis* and *Br. melitensis*, but further investigations are necessary.—
—J. M. ROBSON.

BROWNING, P. (1940). **The Chemotherapy of Experimental Staphylococcal Infection in Mice with Drugs of the Sulphanilamide Group.**—*J. Path. Bact.* **50.** 431–438.

It has been shown for the strain of *Staph. aureus* investigated (injected intraperitoneally with mucin in mice) that monoacetyl diamino diphenyl sulphone has a definite therapeutic effect, prolonging the average duration of life of animals which ultimately die, and increasing the number of survivors, as compared with the untreated controls. Sulphapyridine also has some activity, while sulphanilamide, the prontosil group of dyes, and uleron have a weak therapeutic effect.—J. M. ROBSON.

*GANAPATHI, K. (1940). **Sulphanilamide and Derivatives in Bacterial Infections.**—*Curr. Sci.* **9.** 314–318.

G. reviews the therapeutic properties of sulphanilamide and its derivatives, and discusses their comparative efficacy against streptococcal and other bacterial infections and in virus infections. Some heterocyclic derivatives are claimed to be superior to sulphanilamide itself.—W. M. KHAN.

I. ALYEA, E. P., DANIEL, W. E., & YATES, A. (1939). **Sulfanilamide and Disulfanilamide Concentrations in the Blood and Urine.**—*J. Urol.* **41.** 14–30.

II. HERRELL, W. E., & BROWN, A. E. (1940). **Local Use of Sulphamide Compounds in the Treatment of Infected Wounds.**—*Proc. Mayo Clin.* **15.** 611–615.

III. MCKINNEY, R. A., & MELLON, R. R. (1941). **Dissociative Aspects of the Bacteriostatic Action of the Sulfonamide Compounds.**—*J. infect. Dis.* **68.** 233–245.

IV. WHITE, H. J., BRATTON, A. C., LITCHFIELD, J. T., Jr., & MARSHALL, E. K., Jr. (1941). **The Relationship between the in vitro and the in vivo Activity of Sulfonamide Compounds.**—*J. Pharmacol.* **72.** 112–122.

V. HADLEY, P., & HADLEY, F. P. (1941). **Influence of Sulfanilamide on Mucoid and Smooth-Phase Cultures of Hemolytic Streptococci in vitro.**—*J. infect. Dis.* **68.** 246–263.

VI. NETER, E. (1941). **The Action of Sulfanilamide upon Hemolytic Streptococci Lancefield Groups A and D in Growth-Promoting and Nongrowth-Promoting Mediums.**—*Ibid.* 278–284.

VII. DELAFIELD, M. E., & STRAKER, E. (1941). **Further Observations on Antiseptic Snuffs.**—*Brit. med. J.* Aug. 16th. 221–223.

VIII. JACOBY, F., MEDAWAR, P. B., & WILLMER, E. N. (1941). **The Toxicity of Sulphonamide Drugs to Cells in vitro.**—*Ibid.* Aug. 2nd. 149–153.

IX. GOODWIN, L. G., & FINDLAY, G. M. (1941). **Absorption and Excretion of Sulphonamides Applied Locally. Observations in Rabbits.**—*Lancet.* **240.** 691–692.

X. WALKER, H. A., & VAN DYKE, H. B. (1941). **Observations on the Toxicology of Sulfathiazole and Some Related Compounds.**—*J. Pharmacol.* **71.** 139–150.

I. Sulphanilyl-sulphanilamide is absorbed more slowly from the intestine than sulphanilamide; sodium sulphanilyl-sulphanilamide is absorbed more rapidly than sulphanilyl-sulphanilamide, but more slowly than sulphanilamide. Blood concentration is directly proportional to the dosage administered. The excretion curves of the three drugs practically parallel the blood concentration curves. Patients with poor renal function have a higher

blood concentration level and lower excretion in the urine when on the usual dosage.

II. The clinical results suggest that the local application of sulphonamides (sulphanilamide, sulphathiazole) exerts a beneficial effect on the course of infected wounds. This indicates that the continued local application of sulphonamides is justifiable as a prophylactic measure in infected wounds.

III. Mice with experimental pneumococcal peritonitis were treated with sulphonamides, rather less than maximally efficient doses being used. From these mice a series of intermediate variants of the pneumococcus were isolated and named by the authors "modulations". The series begins with a slightly modified mucoid colony and ends with a minute colony composed of unencapsulated, avirulent organisms. The cells of the variant colonies have as their *in vivo* prototypes several pleomorphic phases of the organism which hitherto have been designated as "involution forms". The several modulations constitute a gradient of diminishing metabolic activity with respect to the formation of hydrogen peroxide, fermentation of inulin, and virulence. All the changes are reversible.

IV. A comparison of the *in vitro* and *in vivo* activity on β-haemolytic streptococci of 126 compounds (sulphanilamide derivatives, sulphones, sulphoxides, sulphides, and certain other compounds) has been made. It has been shown that no compound is active *in vivo* unless it is active *in vitro* or can be decomposed in the animal body to a compound which would be active *in vitro*; compounds can be active *in vitro* but inactive *in vivo*.

V. Concentrations of sulphanilamide up to 1 : 40,000 produced bacteriostatic effects on cultures of a type 5 β-haemolytic streptococcus in the mucoid phase. Its bacteriostatic action on the organism in the S phase was much less. Serial passage of the organism in peptone broth containing increasing concentrations of sulphanilamide resulted in progressive transformation from mucoid to S phase, but usually not earlier than after 72 hours of contact. The mucoid forms of the organism were found more commonly associated with acute infections, while the S forms were more commonly associated with subacute or chronic infections.

VI. Sulphanilamide (1%) produced no detectable bactericidal effect upon group A and group D haemolytic streptococci that were freed from nutrient material and exposed to the action of the drug in a non-growth-promoting medium for several hours. During the same period the drug exerted bacteriostatic activity upon these organisms suspended in a growth-promoting medium.

VII. An antiseptic snuff containing sulphathiazole (10–50%) is effective in causing a marked reduction in staphylococci in nasal carriers of this organism. The carriers are not cured, as the organism reappears within a few weeks of the cessation of treatment. It is effective in the cure of carriers of *Corynebacterium hofmannii*, and may be effective in the treatment of carriers of haemolytic streptococci and of meningococci, but not of pneumococci [see also *V. B.* **11.** 686].

VIII. The effects of sulphanilamide, sulphathiazole, sulphapyridine, and sulphadiazine on the growth of fibroblasts, macrophages, and epithelium cells *in vitro* have been investigated by a number of techniques. Compared at equal concentrations, sulphathiazole is the most toxic of these drugs. The effective toxicity under the conditions of clinical application is, however, determined by the relative solubility of the drugs and falls into the decreasing order sulphanilamide → sulphathiazole → sulphapyridine and sulphadiazine. The growth inhibition and unfavourable morphological effects produced by the highest concentrations of sulphathiazole are followed by complete recovery on removal of the drug. Cells are not capable of withstanding prolonged subjection to the highest concentrations of sulphanilamide, but recovery takes place from concentrations of 1 : 150 downwards. Neither sulphapyridine nor sulphadiazine inhibits significantly in saturated solution. The feeble inhibitory action of the sulphonamides contrasts favourably with that of proflavine.

IX. Sulphanilamide, sulphapyridine and sulphathiazole were applied to uninfected wounds in the rabbit and the rates of absorption and excretion estimated. With sulphanilamide, blood concentrations of over 2 mg.% were obtained for short periods, but the values with the other two compounds were smaller. Sulphanilamide was excreted rapidly, sulphathiazole less rapidly, and sulphapyridine still less rapidly. About 90% of excreted sulphanilamide, and 75% of excreted sulphathiazole and sulphapyridine were in the conjugated form.

X. The doses of sodium salts of sulphanilamide, sulphapyridine, sulphathiazole, and sulphamethylthiazole which subcutaneously caused a 50% mortality in mice were, in terms of millimols per kg. body weight as follows:—sulphanilamide, 13·45; sulphapyridine, 3·24; sulphathiazole, 5·18, and sulphamethylthiazole, 3·29. The toxic effects of repeated doses of these drugs were compared by feeding them mixed with the food in concentrations of 0·5 and 1% to growing rats. Concretions and associated damage of the kidneys, an increase in the percentage of neutrophiles in the blood, and interference with growth, were all most strikingly present with sulphamethylthiazole, which also caused lymphoid atrophy of the spleen. After administration by stomach tube in rats sulphathiazole and sulphapyridine were equally well absorbed, but much less of the sulphathiazole underwent conjugation.
—J. M. ROBSON.

—. (1941). **The Prevention and Treatment of Infection in Wounds by Sulphonamides. With Special Reference to Topical Application.** pp. 27. Dagenham: Pharmaceutical Specialities (May and Baker) Limited. [8vo].

In the early stages of work on the sulphonamides it was believed that these compounds were effective only when given orally or parenterally. Recent work, however, is tending to show that the local application of sulphonamides is of value in dealing with infections in wounds and burns. Better results are obtained in the prevention than in the treatment of infections, and oral administration, in addition to topical application, appears to be necessary to deal with established infections. The booklet reviews results obtained in the treatment of wounds and emphasizes the fact that sulphonamides should not be applied to wounds involving nerve tissue.—J. M. ROBSON.

I. SMITH, M. I., LILLIE, R. D., & STOHLMAN, E. F. (1941). **The Influence of Dietary Protein on the Toxicity of Sulfanilamide.** —*Publ. Hlth Rep., Wash.* **56.** 24–29.

II. RICHARDSON, A. P. (1941). **Effect of Sulfur Compounds in the Diet on Sulfanilamide Cyanosis and Anemia.**—*J. Pharmacol.* **71.** 203–209.

I. A low protein diet (7%) increased the susceptibility of rats to orally administered sulphanilamide by increasing the mortality and the incidence of anaemia, as compared with rats on a diet containing 30% protein. Supplementing the low diet with cystine plus methionine decreased the mortality but not the incidence of anaemia. Histological examination failed to reveal specific damage due to sulphanilamide and low protein treatment.

II. The sulphaemoglobinaemia in mice due to sulphanilamide was found to be dependent on the sulphur content of the diet. Thiosulphate, flowers of sulphur, and sulphurated potash (potassium polysulphide) were the most effective while magnesium sulphate and thiourea were ineffective. Mice given sodium nitrite in a high sulphur diet developed cyanosis, which was associated only with methaemoglobin and a moderate degree of anaemia.—J. M. ROBSON.

PAGEL, W. (1941). **The Effect of Seal Oil and Glycerol Broth Treatment on Anti-tuberculous Vaccination.**—*J. Path. Bact.* **52.** 383–385.

Weekly intraperitoneal injections of 0·1 ml. of seal oil greatly enhanced the protective value for g. pigs of a heat-killed *Mycobacterium tuberculosis* vaccine. Three months after infection with a virulent human strain, there were ten almost completely protected animals among 40 which had previously received the vaccine alone, whereas there were 21 protected animals in a comparable group which had received vaccine + seal oil. P. has previously shown that seal oil alone has no effect upon subsequent tuberculous infection. A slight protective effect appeared to be obtained when seal oil was combined with glycerol broth, but it was much less conspicuous than that obtained with vaccine + seal oil.—A. N. W.

HAWKING, F. (1941). **Drug Resistance Acquired during the Treatment of Sleeping-Sickness with Tryparsamide and with Bayer 205.**—*Amer. J. trop. Med.* **21.** 469–479.

Tests were made in rats on the sensitivity to tryparsamide of 23 strains of *Trypanosoma rhodesiense* from untreated human patients and of five strains from four patients who had received repeated courses of tryparsamide. The sensitivity of the strain was judged by the size of the minimum effective dose; this was taken as the least dose sufficient to free from trypanosomes the blood of the majority of a group of rats for two out of the first three days after intraperitoneal administration. The

M.E.D. for strains from untreated patients varied from 12·5–100 mg. per 100 g. body weight, whilst in the four strains from treated patients who had relapsed it was 50, 100, 200, and ? 200 mg. respectively, and for one strain from a patient who had relapsed twice it was 400 mg. It is concluded that trypanosomes from patients who relapse after tryparsamide have a greater resistance than the normal, but this resistance is not as great as that which can be obtained experimentally in laboratory animals. This resistance may have been inherent in the infecting strain and thus be accountable for the relapse, but a strain from one patient showed an increased resistance when tested after a relapse following a second course of treatment. A limited number of strains from patients who had relapsed after germanin were also tested for decreased sensitivity to that drug, but no increased resistance could be detected.—U. F. R.

T'UNG, T. (1940). **Recent Studies on the Effect of Photodynamic Action on Microorganisms.**—*Chin. med. J.* Suppl. No. 3. 304–320. [In English].

T. reviews recent work carried out at Peiping on the photosensitization of various bacteria and *Trypanosoma brucei* with various dyes amongst which eosin, methylene blue, safranin O, mercurochrome, and acriflavine were included. Two specimens of mixtures of organism suspensions with dye dilutions were made, one being exposed to light and the other kept in the dark, the photodynamic action being judged by the growth of organisms on plates of appropriate media after 48 hours' incubation. Organisms varied in their susceptibility to photosensitization by the various dyes, and it was found that each of the dyes had its special absorption band in the spectrum, although in the case of acriflavine unfiltered light was particularly effective.

Eosin, mercurochrome, and methylene blue were found to be most effective for Gram-positive bacteria, eosin being the most active for most organisms though methylene blue was more active for gonococcus and *Vibrio cholerae*. Safranin O was found to be the most active dye for Gram-negative organisms.

The addition of hydrogen peroxide to the dye and bacterial suspension mixtures greatly increased the photodynamic action, thus supporting the theory that photosensitization nvolves a process of oxidization.

The killing of organisms by photodynamic action appears to produce less alteration of bacterial protein than the action of formalin or heat. Photodynamically inactivated pneumococci retained their Gram-positive property for a year even though kept at 37°C., whilst gonococcus and *T. brucei* retained their cellular integrity at incubating temperature for two months, whereas if killed by formolin they were autolysed in two weeks, and if killed by heat in a few days.

Vaccines prepared by the photodynamic action of methylene blue on type 1 pneumococcus produced a better immunological response than vaccines prepared by formalin or heat inactivation, but similar vaccines prepared for *T. brucei* failed to confer any demonstrable immunity on experimental animals.—U. F. R.

KRANEVELD, F. C., & NASOETION, A. (1940). Sulfanilamide als therapeuticum tegen mond- en keeltrichomoniasis bij duiven. **[Sulphanilamide Therapy of Mouth and Throat Trichomoniasis in Pigeons].**—*Ned.-ind. Bl. Diergeneesk.* **52.** 160–169. [English and French summaries]. [Abst. from English summary].

Complete recovery took place in almost all cases with submucous, necrotic processes after a single injection, or after three injections made every other day, of 0·5 c.c. of a 10% suspension directly into the abscesses. Intramuscular injections of the same dose repeated 2–3 times on alternate days also gave good results.

80–100% of cases with fibrinous, diphtheritic processes were cured by daily local administration of 0·5 c.c. of a 10% suspension, or by painting with a paste of sulphanilamide. 90–100% recoveries followed inoculations, repeated on alternate days, of the same dose into the breast musculature. In these cases, trichomonads could be demonstrated in the throat mucosa for varying periods after clinical recovery had taken place, while some of the birds persistently remained carriers. No relapses were, however, observed.

CARPENTER, C. D. (1940). **A Study of Aqueous Colloidal Sulphur in the Control of Eimeria Tenella in the Fowl.**—*Poult. Sci.* **19.** 371–379.

In recent years much attention has been paid to the prevention or cure of caecal coccidiosis in chickens by therapeutic treatment. Little of value has emerged from these investigations,

which included the feeding of flowers of sulphur to affected birds. In the present experiments aqueous colloidal sulphur at a concentration of 1% in drinking water failed to protect birds against doses of 7,500–100,000 mature oocysts of *E. tenella*, irrespective of the intervals at which the substance was fed before and after the chickens were infected. Mash containing 30% of aqueous colloidal sulphur protected birds against doses of 1,500–15,000 oocysts, but produced fatal nephritis. When 2% was administered in the same way, the birds were protected against similar doses and yet showed no adverse effects during the period of the tests. When mash containing 3% and 7% was fed protection was afforded to birds receiving 15,000 and 25,000 oocysts respectively.

—C. HORTON SMITH.

BRUCE, W. G. (1940). **The Medication of Cattle for the Control of Horn Flies.**—*J. Kans. ent. Soc.* **13.** 41–43.

B. tested 29 chemicals, including phenothiazine, to determine their value in preventing the development of the larvae of *Lyperosia irritans* in cattle faeces, and found rotenone to be the most effective. The rotenone was mixed with bran and fed to the cattle. The minimum effective dose was 0 3 g. per cwt. body weight administered daily, and had no apparent harmful effect on the animals. The faeces became unfavourable for larval development about ten hours following the initial administration, after which all faeces voided up to 30 hours from the time of treatment were highly toxic to larvae.—W. MOORE.

MACKELLER, R. S., Jr. (1941). **The Treatment of Horses for Strongylosis with Quarcyl.** —*Vet. Bull. U. S. Army.* **35.** 20–23.

Good results followed the administration of "quarcyl", a powdered arsenical preparation of unstated composition, in moist bran or oats after 24 hours' fasting. A marked improvement in bodily condition was noted, and the effectiveness of the drug was checked by repeated faecal examinations. The preparation was well tolerated even in large doses.—M. L. BINGHAM.

PETERS, B. G., LEIPER, J. W. G., & CLAPHAM, P. A. (1941). **A Phenothiazine Experiment Statistically Treated.**—*J. Helminth.* **19.** 9–24.

Phenothiazine was administered to lambs, with and without glycocholate and hexylresorcinol as wetting agents, as a drench in quantities of 0·15 and 0·3 g. per kg. body weight. Live-weight determinations and egg counts in the faeces were made before and after treatment, and the actual worm burden was counted at autopsy three weeks later. The egg counts were made according to the modified McMaster technique described by PETERS & LEIPER [*V. B.* **11.** 695]. The whole experiment on 18 lambs was planned on a statistical lay-out and the results were examined by Fisher's Analysis of Covariance technique by which the regression of after-treatment on before-treatment data was determined and the variances relating to error and treatment were reduced to those relating to the corresponding deviations from the regression line. The principal findings were that phenothiazine had no significant effect on worm burden, egg counts, or live-weight changes over the experimental period. In mixed worm infestations where the individual eggs could not be identified, a significant correlation between worm-burden and egg counts was found, provided that appropriate "weighting coefficients" were used for each kind of worm present. Detailed analysis of individual egg counts showed that the variance for days and for lambs was very high and that adequate replication of these two factors was necessary.

The authors attribute the discrepancy between their poor results with phenothiazine and the good results claimed by certain other workers mainly to the lack of a statistically sound lay-out in other workers' experiments, lack of effective controls, and failure to appreciate the enormous variations encountered in egg-counting technique. They admit, however, that "there is a small residue of quite startling cases where it is obvious without statistical analysis that phenothiazine has been entirely satisfactory" and are at a loss to explain these.

In a postscript it is stated that the proofs of this paper were shown to FISHER who advised certain recalculations in one of the tables. As a result the conclusion was reached that there was actually a significant reduction in egg counts due to phenothiazine, equally marked at the single as at the double dose of the original experiment. This did not alter the fact that more worms were found P.M. in treated than in untreated lambs, and the authors state that such a result is of no practical interest to farmers.

[The abstractor has omitted any reference to

certain controversial matters contained in this paper. The average reader may be puzzled by the difference in conclusion as to the effect of phenothiazine upon egg counts contained in the main portion of the paper and the apparently contradictory view concerning this effect as expressed in the postscript. Readers interested in this particular topic are strongly advised to consult and study the original.]—A. EDEN.

I. LIPSON, M., & GORDON, H. McL. (1940). **The Passage of Phenothiazine through the Alimentary Canal of the Sheep.**—*J. Coun. sci. industr. Res. Aust.* **13.** 240–244.

II. GORDON, H. McL. (1940). **The Anthelmintic Efficiency of Phenothiazine against Immature** *Haemonchus contortus.*—*Ibid.* 245–246.

I. Phenothiazine was usually detectable in the faeces of sheep 12 hours after administration. Preliminary administration of copper sulphate solution reduced this period. Faecal concentration reached a maximum at the end of the first day or at the beginning of the second day after dosing, and elimination was usually complete at the end of the fourth day, being prolonged if constipation supervened. The average amount of phenothiazine passed in the faeces was 32% of the dose received (2 sheep). There was no correlation between anthelmintic efficiency against *Oesophagostomum columbianum* and the concentration attained in the faeces.

II. Phenothiazine in doses of 0·6 g. per kg. body weight was highly efficient in destroying immature *H. contortus* 10–15 days old. The practical significance of this in dealing with outbreaks of haemonchosis is briefly discussed.

GARRETT, H. E. (1940). **Lamb and Hogget Drenching Trials in Canterbury, 1938–39.**—*N.Z. J. Sci. Tech.* **22.** 110A–115A.

Experiments conducted on two properties in the Canterbury district to determine the anthelmintic efficiency of a drench containing 2% copper sulphate and 2% nicotine sulphate (lambs receiving 1 fl. oz. and hoggets 1½ fl. oz. at intervals of 10–14 days) resulted in a considerably reduced mortality in the drenched animals. Drenched lambs were healthier and heavier than the controls.—M. B. BUDDLE.

BROWN, H. W., & SHELDON, A. J. (1941). **Treatment of the Canine Heartworm (Dirofilaria immitis) with Fuadin and Sulfanilamide.**—*J. Amer. vet. med. Ass.* **98.** 477–481.

Dogs infested with *D. immitis* were treated by fuadin or by sulphanilamide, or by a combination of the two drugs. The best results were obtained in six dogs which received, over a period of ten days, 4–5 g. per kg. body weight of sulphanilamide daily in two doses *per os* and 1–2 c.c. of fuadin each day intramuscularly. In one of these dogs, the number of microfilariae in blood films was reduced by 96%, whilst no microfilariae could be detected in tests made on the other five at intervals up to 22 days after the last treatment, when these five were killed. At P.M. examination, several living adult worms were found in the hearts of two out of the five, but in neither case were larvae observed in the female worms. Of four dogs given a ten-day course of fuadin alone, two showed no microfilariae in blood films, one showed an 88% reduction, and one no reduction. No adult worms were found at autopsy of three of these dogs. Some of the treated animals exhibited slight febrile symptoms, while others showed a slight corneal opacity which, however, disappeared spontaneously despite continuation of treatment.—M. L. B.

POHLE, W. D., & STUART, L. S. (1940). **The Germicidal Action of Cleaning Agents—A Study of a Modification of Price's Procedure.**—*J. infect. Dis.* **67.** 275–281.

The rate at which the bacterial flora of the hands can be removed by washing was studied the method of PRICE [*V. B.* **11.** 270.] being used. The hands were washed in a series of bowls and the bacterial content of each bowl was then examined. The bacterial flora varied greatly in different individuals. The "transient flora", which varied from time to time, could fairly easily be removed by washing but the "resident flora" was very difficult to remove whatever agents were employed. The relative values of different cleaning agents were not determined.—JOHN FRANCIS.

SCHULZE, H. (1938). Untersuchungen über den Einfluss von therapeutischen Schwefelgaben auf den Blutzuckerspiegel bei Hunden. **[Influence of Sulphur Therapy on the Blood Sugar of Dogs].**—*Inaug. Diss., Leipzig.* pp. 32.

A review is given of previous work on the influence of drugs on carbohydrate metabolism.

S. administered various sulphur-containing drugs to four dogs in therapeutic doses by various routes and the changes in blood sugar and the clinical condition of the animals were followed. When given intramuscularly, or as ointments rubbed into the skin, there was no influence on blood sugar. Intravenous injections produced a definite rise in the blood sugar level (as high as 60% above normal). Oral doses often produced no effect, but sometimes caused a significant rise. In some cases marked reactions (weakness etc.) resulted after the administration of the sulphur drugs.

Throughout the series of experiments there were marked individual variations in the responses of the four animals and S. concludes that the conflicting results observed in these experiments (and also in previous work) are due partly to the type of drug used, partly to the route of administration, and partly to differences in the experimental animals. The experiments give no information regarding the mechanism of the effects of the drugs on blood sugar.—F. Aylward.

PUBLIC HEALTH

Beveridge, W. I. B. (1940). **An Alkaline Culture Medium for Differentiation of Staphylococci and Micrococci from Cow's Milk.**—*Aust. J. exp. Biol. med. Sci.* **18.** 391–392.

Alkaline blood agar (pH 9·0) inhibits micrococci but supports a good growth of staphylococci; the medium may therefore be used for isolating small numbers of staphylococci from milk containing large numbers of micrococci. Ability to grow on alkaline blood agar showed a close positive correlation with haemolysis in a series of strains of staphylococci and micrococci isolated from milk. Growth on this medium may also be a useful indication of pathogenicity in strains of human origin.

Seelemann, M., & Pfeffer, A. (1939). Zum Nachweis der Bruzella abortus Bang in der Milch. **[Testing for *Br. abortus* in Milk].**—*Z. InfektKr. Haustiere.* **55.** 264–282.

Five cultural methods were used. (1) A simple method in which 10 c.c. of milk were centrifuged at 3,000 r.p.m. for 30–40 min.; a loopful of cream was plated and also one of sediment. (2) The Klitzschmüller method in which 10 c.c. of milk were centrifuged for 5 min. to remove gross contaminants, the supernatant poured into a fresh tube, and 1% boric acid and 1% potent *Br. abortus* serum added. After two hours' incubation the sediment was plated after spinning at 3,000 r.p.m. Methods (3), (4), and (5) were variations of (2), *viz*, (3) with centrifuging and serum, without boric acid; (4) without centrifuging and boric acid, with serum; (5) without centrifuging and serum, with boric acid. In all cases the culture medium used was liver agar, pH 7·0–7·2 with gentian violet 1 : 300,000 and malachite green 1 : 600,000. 208 samples from reactors and non-reactors were cultured by the first three methods. Thirty-seven proved positive for *Br. abortus* by at least one method, and five by all three. Method (1) demonstrated growth in 23 cases, (2) in only 12, and (3) in 22.

In testing serologically positive quarter samples by the five methods, method (5) was found to be the most successful. A comparison was made between these methods and g. pig inoculation, milk of high agglutinating titre being selected; methods (1) and (4) proved best, each giving 29 positive results from 42 samples, whereas the g. pig method gave 36 positive cultural findings eight weeks after inoculation.

When artificially infected samples were tested, method (2) was found to be the most reliable as contaminants were few.

The effect of other dyes used in the medium was investigated. When Victoria blue 1 : 20,000 was substituted for malachite green and gentian violet, more colonies grew. The addition of zephirol was found to be detrimental to growth. The use of different brands of peptone for the culture medium was also investigated. Parke Davis Nos. 43 and 42 are recommended, also Witte's *fest*.

No success was obtained in attempts at culturing mixed milk samples, for even with the use of Victoria blue there was too great a contamination of the plates. Simultaneous cultural and animal inoculation tests are recommended for the demonstration of *Br. abortus* in milk samples. Cultural method (1) and the use of Victoria blue are recommended.—D. L. R.

Ehrström, W. (1940). Mjölkhygienen vid de nordiska veterinärmötena. **[Discussions on Milk Hygiene at the Scandinavian**

Veterinary Congresses].—*Skand. Vet-Tidskr.* **30.** 1006–1016. [English and German summaries]. [Abst. from English summary].

The author describes the questions concerning milk hygiene which were discussed at the Veterinary Congresses held in Copenhagen in 1902, Stockholm in 1921, Oslo in 1928, Helsinki in 1933, and Copenhagen in 1939.

The most important result of these meetings was the organized co-operation of those attending the congresses so that, although there were no official agreements, actual co-operation throughout Scandinavia resulted in a common programme dealing with milk-control. This programme was accepted at a meeting of delegates from these countries, held in Stockholm in 1934. It gave a uniform arrangement of the organization of milk-control. The foundation has also been laid of standard methods for laboratory investigations, which, it is considered, will lead to the desired end. Veterinary public health workers in the four countries are endeavouring to bring about control of hygienic conditions in farmyards, so as to obtain a standard in this sphere as well.

KAUKER, E. (1940). Die bakt. Fleischuntersuchung im Warthegau. [**Bacteriological Meat Inspection in Wartheland**]. —*Dtsch. tierärztl. Wschr.* **48.** 532–533.

After giving notes on the local needs for a meat-inspection laboratory to serve the new *Reichsgau* of Wartheland [see *V. B.* **11.** 880.], K. describes the first few months' work. 716 samples of material were examined, and meat-poisoning organisms were detected in 19 cases (*Salmonella enteritidis* in 17 and *S. typhimurium* in two), *i.e.*, an incidence of 2·65% in all material examined. Rabies was diagnosed from the brains of four bovines. Swine erysipelas was diagnosed frequently and anthrax once.—J. E.

I. GIESE. (1940). Bekanntmachung des neuen Fleischbeschaugesetzes vom 29. Oktober 1940. [**Announcement of the New Meat-Inspection Law of October 29th, 1940**].—*Dtsch. tierärztl. Wschr.* **48.** 563–566.

II. HEINE. (1941). Ausführungsbestimmungen A und B zum Fleischbeschaugesetz. [**The New Executive Designations A and B for the Meat-Inspection Law**].—*Ibid.* **49.** 55–56 and 67–68.

I. The reasons for bringing the previous meat-inspection law up to date are briefly explained as being certain technical advances and the desire for the standardization of meat inspection in all parts of "greater Germany". There are to be six executive designations which lay down the regulations for each branch of the work, A being concerned with *ante-* and *post-mortem* inspection of the animals, B with the training of meat inspectors, C with elementary instruction on animal and meat inspection, D with imported meat, E with meat for export, and F with inspection places for imported meat. These matters are discussed in comparison with the old regulations.

I. Executive designations A and B are discussed paragraph by paragraph, and changes occasioned by the new law are pointed out.

—J. E.

TECHNIQUE AND APPARATUS

GLADSTONE, G. P., & FILDES, P. (1940). **A Simple Culture Medium for General Use without Meat Extract or Peptone.**—*Brit. J. exp. Path.* **21.** 161–173.

Technical details are given of the apparatus, and of the preparation of stock substances and solutions, required for a culture medium for routine bacteriological purposes. An acid hydrolysate of casein supplies the necessary amino-nitrogen content of the medium which is supplemented with a small amount of tryptic digest of casein to replace certain amino-acids partially destroyed by acid hydrolysis. Watery extract of yeast and glutamine provide most of the essential co-factors and sodium glycerophosphate serves as a buffer and may also act as a source of energy, a further supply of which is provided by the addition of sodium lactate. The cost of production of the medium is small, its constituents keep indefinitely and are likely to remain easily obtainable, and, with a few essential modifications, all the bacteria encountered in routine medical bacteriology grow in it. Certain modifications are recommended for the growth of bacteria which generally require selective media and characteristics of the growth obtained are described. Although the medium contains neither meat

extract nor peptone, growth is better on this medium than on those containing these substances.—R. O. MUIR.

PASRICHA, C. L., & GHOSH, S. K. (1941). **A Simple Method of Obtaining Anaerobiosis.**—*Indian med. Gaz.* **76.** 88–89.

The authors have demonstrated that the removal of oxygen during the rusting of iron can be used for producing anaerobiosis. 60 g. of iron filings kept in a 1,000 c.c. air-tight jar and moistened, will produce sufficient anaerobiosis overnight to permit the growth of strict anaerobes. Other possibilities for using iron filings to obtain other types of anaerobic cultures have been investigated with success.
—V. R. RAJAGOPALAN.

MISCELLANEOUS

I. —. (1939). Tierkörperbeseitigungsgesetz. Vom 1. Februar 1939. [**Germany: Law on the Disposal of Animal Carcasses**].—*Dtsch. Tierärztebl.* **6.** 103–104. [Also appeared in *Reichsgesundheitsblatt.* **14.** 268–269. (1939)].

II. —. (1939). Erste Durchführungsverordnung zum Tierkörperbeseitigungsgesetz. Vom 23. Februar 1939. [**Germany: First Executive Order on the Law on Disposal of Animal Carcasses**].—*Ibid.* 127–128. [Also appeared in *Reichsgesundheitsblatt.* **14.** 290–292. (1939)].

III. —. (1939). Deutsches Reich. Zweite Durchführungsverordnung des Reichsministers des Innern zum Tierkörperbeseitigungsgesetz. [**Germany: Second Executive Order on Law for Disposal of Animal Carcasses**].—*Ibid.* 215. [Also appeared in *Reichsgesundheitsblatt.* **14.** 513–515. (1939)].

I. The objects of the law were twofold, namely to destroy pathogenic micro-organisms present in animal carcasses and to utilize economically the carcass material (in two forms, as animal meal and as fat). Carcass disposal plants were to be built in numbers sufficient for areas demarcated on the basis of farm animal density, and all pre-existing knackeries were to be abolished. Where great difficulties existed in the collection of carcasses, it was permissible to bury carcasses.

Farmers were obliged to report the presence of dead animals to the local authority and to supply free assistance in the collection of the carcass. They were granted a sum of money calculated from the value of the animal.

II & III. These gave more detailed instructions on the various paragraphs of the text of the law. Certain exceptions to the terms of the law were granted for the benefit of zoological gardens, fur animal farms, and biological institutes. Abattoirs possessing carcass rendering plants were permitted to act as disposal plants.

Animal meal produced must be free from disease organisms, must contain less than 10% fat and at least 50% protein. Carcass fat must contain at least 97% saponifiable fat.

Part III was concerned with the building and management specifications of the disposal plants and collection motor boxes.—J. E.

—. (1941). **Discussion on How Agriculture and Veterinary Science Can Assist Production In Australia.** [Speakers: HENRY, M., GILL, D. A., WENHOLZ, MOODIE, A. W. S., GUNN, CARNE, FRANKLIN, & LOWNDES].—*Aust. vet. J.* **17.** 33–40.

This reports a joint meeting of the New South Wales branch of the Australian Institute of Agricultural Science and of the Veterinary Association of New South Wales. The following broad aspects were considered:– the influence of feed on the health of livestock, the role of veterinary science in relation to animal production in Australia, crop improvement, and the improvement of pastures.—H. B. CARTER.

MACDONALD, A. J. (1940). **The Poultry Industry in India.**—*Indian Fmg.* **1.** 60–62.

A brief account is given of the fowl population and the value of poultry products in India. The importance is stressed of improving human diet by increasing the present low average annual egg consumption of eight eggs per head of population. Various schemes for assisting poultry farmers are mentioned and a description is given of the important research being carried out at the poultry section of the Imperial Veterinary Research Institute, Izatnagar.

OFFICIAL AND OTHER REPORTS

CANADA. (1940). **Report of the Ontario Veterinary College, 1939.** [MCGILVRAY, C. D.] pp. 27. Toronto: T. E. Bowman. [8vo].

There were 219 students attending the five-year course during the year. Lists of the teaching staff, of subjects of special courses for veterinary public health workers, fur animal breeders, and veterinary practitioners, and of special research projects are given, as well as short reports on clinical work, diagnostic examinations etc.

The following detailed articles are also included.

1. CO-OPERATIVE PLANS FOR THE CONTROL OF BANG'S DISEASE. [MCGILVRAY, C. D.]—Control in Ontario is effected either by individual herd testing (21,341 cattle were tested in 1939 and 18·5% were reactors or doubtful reactors), or by supervised testing in prescribed areas. The latter is carried out free of charge by two plans, one designed for herds with less, and the other for herds with more, than 10% of reactors; operational details are given. A total of 913 cattle were tested in 1939 and 90% were non-reactors. Calfhood vaccination with strain 19 was carried out in 56 herds; results were not yet complete.

2. DISEASES OF SWINE. [SCHOFIELD, F. W., & INGLE, R. T.]—This is a short account of swine fever, swine erysipelas, haemorrhagic septicaemia, salmonella infection, influenza, and parasitism in the province during the year.

3. FATALITIES AMONG PIGS FOLLOWING OVERDOSES OF IRON. [SCHOFIELD, F. W., & INGLE, R.T.]—Deaths are described in piglets 1–2 days after being dosed in excess with reduced iron to prevent anaemia. It is suggested that the iron "causes a break in the defence mechanism, allowing organisms already present . . . to penetrate and cause serious infection". P.M. examination revealed lesions of septicaemia. The condition was reproduced experimentally in three piglets.

4. "STIFF LAMB DISEASE"—AN APHOSPHOROSIS? [SCHOFIELD, F. W., & BAIN, A. F.]—A small group of "stiff" lambs recovered after receiving doses of dilute phosphoric acid in milk.

5. THE RAPID ISOLATION OF THE VIRUS OF EQUINE ENCEPHALOMYELITIS. [SCHOFIELD, F. W.]—Blood taken from horses during the early febrile state is used to infect g. pigs (intracerebrally and intraperitoneally) and chick embryos. The latter are examined in due course for typical lesions and the g. pigs for typical symptoms. Virus typing is done in suitably immunized g. pigs with virus recovered from the egg embryos.

6. MALIGNANT EQUINE INFLUENZA. [SCHOFIELD, F. W.]—Four cases in a single outbreak are described.

7. DISTEMPER IN MINK. [STEVENSON, L., & SCHOFIELD, F. W.]—This is a description of the disease. Dog distemper antiserum has failed to protect or cure, but a formolized lung and spleen vaccine gave promising results.

The report is concluded by clinical case reports of LEUCAEMIA in a cow, NECROTIC STOMATITIS in calves, and PREGNANCY DISEASE in a ewe.—J. E.

AUSTRALIA. (1940). **Live Stock Diseases Reports—Stock Branch, Department of Agriculture, New South Wales, 1938–39.** [HENRY, M.] pp. 2. [fcp] [Mimeographed].

A very brief statistical resumé of livestock movements to and from New South Wales, the class and number of imported and exported stock, etc., and the incidence of the following conditions:– ANTHRAX, TUBERCULOSIS, ACTINOMYCOSIS, BOVINE CONTAGIOUS PLEURO-PNEUMONIA, CANCER, TICK FEVER, lice and ked infestation (in sheep), and cattle tick (*Boophilus australis*) infestation.—H. B. CARTER.

DUTCH EAST INDIES. (1940). Jaarverslag van den burgerlijken veeartsenijkundigen dienst, Veeartsenijkundig Instituut Buitenzorg, Java, over 1939. [**Report of the Veterinary Institute, Buitenzorg, Java, for 1939**]. [HUBER, F. L.] pp. 67–108. Batavia: Landsdrukkerij. [4to].

There were four Europeans on the staff.

GENERAL DIAGNOSIS SECTION [KRANEVELD, F. C.]—After lists of the results of diagnostic examinations, notes are given of special investigations of which the following are the most important:– research on ANTHRAX, comprising faecal examinations in domestic and wild animals for *Bacillus anthracis*, observations on BACTERAEMIA, and experiments on insect transmission [see *V. B.* **11.** 827]. Attempts to diagnose "PSEUDOTUBERCULOSIS" in goats

with an antigen prepared from *Corynebacterium pseudotuberculosis* failed; staphylococci were found to be responsible. Work on SURRA showed that Dutch East Indies strains of *Trypanosoma evansi* could become drug fast, that this trypanosome disappeared from the blood 7–8 hours after naganol therapy, and that the urine of treated horses was lethal for *Tryp. evansi* from 5–37 hours after treatment. Some birds [unnamed] were found to be capable of carrying *Tryp. evansi* for long periods. Attempts to prepare a vaccine against surra failed. *Trichomonas columbae* was isolated from throat lesions in pigeons. A disease of cattle in Lombok named *sakit ingoesan* was investigated with negative results; it is possibly BOVINE MALIGNANT CATARRH. Attempts to incriminate *Onchocerca* in the causation of PERIODIC OPHTHALMIA in horses failed.

SECTION FOR SERO-DIAGNOSIS AND CHRONIC INFECTIOUS DISEASES [VAN DER SCHAAF, A.]—16,528 complement-fixation tests for GLANDERS produced 615 positive reactions, and about 600 of 16,465 blood tests for BRUCELLOSIS were positive. A table shows the comparative results of c.-f. and agglutination tests in this work. An attempt to produce a vaccine against glanders by an avirulent culture of the causal organism in liquid paraffin failed. It had been previously established that horses infected with MELIOIDOSIS might react to mallein and to the c.-f. test for glanders. All the sera received for glanders diagnosis were tested for melioidosis and 152 reacted. The latter infection is harmless to horses. In comparative tests with the ophthalmic and double intradermal tuberculin tests (the latter using synthetic medium tuberculin) on 63 cattle seen to be affected with TUBERCULOSIS at autopsy, there were 17 + and 23 ± results with the former test and 44 + and 15 ± in the latter. In tests on 150 cattle appearing free from TB. at autopsy, there were 123 – and 20 ± with the former test and 107 – and 27 ± with the latter. In type differentiation work, 15 strains of *Mycobacterium tuberculosis* from cattle were found to be bovine type strains and one a human type; one strain from a dog was a human type. The human strain of bovine origin was isolated from the mediastinal lymph nodes of a calf which showed no gross lesions of TB. Spontaneous TB. occurred in the stock g. pigs. An experiment on calves gave no ground for the popular supposition that a tuberculin test sensitizes a calf to natural infection. Notes are given on some local control schemes for bovine BRUCELLOSIS and on research on brucellosis combined with ARTHRITIS in cattle [*V. B.* **11.** 38].

SERUM AND VACCINE SECTION [DE BOER, E.]—100 large serum-producing animals were in use and almost two million c.c. of antiserum and 1,320,000 c.c. of vaccines were produced. Vaccination against HAEMORRHAGIC SEPTICAEMIA was carried out on a large scale in Java and Celebes on about 90,000 buffaloes, 36,000 pigs, and a few hundred cattle. Results were excellent. Post-vaccination shock occurred in about one animal in 1,000: its causes have been studied [*V. B.* **11.** 838]. ANTHRAX and BLACKLEG serum and vaccine were also issued in large amounts.

The report is concluded with a list of publications issued during the year.—J. E.

BOOK REVIEWS

HASSALL, A., DOSS, M. A., TAYLOR, R. M., CARSON, G. B., & BERO, D. (1940). **Index-Catalogue of Medical and Veterinary Zoology. Part 4. Authors: D to Dzunkovski.** pp. 963–1176. Washington, D.C.: Superintendent of Documents. [8vo] [30 cents]. [For previous parts, see *V. B.* **4.** 167, and **10.** 807].

A further part of the revised edition of STILES & HASSALL's author catalogue. The references for this part extend up to 1939.—E. S.

LAWRENCE, A. S. C. [Ph.D.]. [1941]. **The Scientific Photographer.** pp. x + 180. 83 figs., 5 plates, 2 appendixes. London: Cambridge University Press. [8vo] [18s.]

Scientific workers as a whole do not appreciate the opportunities which photography offers them in furthering their work, and those who do, may suffer from a lack of knowledge of the fundamental principles underlying the various procedures which they essay.

This book contains a considerable amount of useful information, admirably illustrated by graphs, diagrams, and figures. The information is perhaps too brief in some instances, but the level of the "scientific" portions, which comprise about two-thirds of the whole, is high

and these sections make profitable reading. Rather sketchy and elementary sections on such subjects as the mechanism of the camera, the choosing of a camera, pictorial composition (chapter 5) etc. seem hardly to compare with the general standard of these more important sections. Not a few readers will disagree with the author's statement that the principal object should never be placed in the centre of the picture. The sections on the practical use of filters, photomicrography, and the photography of laboratory specimens might, with advantage, have been expanded to the exclusion of some of the rather elementary matter that is included.

Publishers often seem to believe that scientific literature must be very well dressed, with the result that prices are often too high for purchasers of moderate means such as teachers, lecturers, research workers, students, etc.; this book is an example of that type, and the price may limit the circulation of such a useful book.

—N. S. BARRON.

ALLEN, R. M. (1940). **The Microscope.** pp. viii+286. 82 figs., 17 plates. London: Chapman & Hall. [8vo] [15s.]

The author covers in one volume all aspects of microscopy including the history and development of the microscope, present-day types and usage, and special apparatus, with a final chapter on section cutting, stains and staining, mounting and special methods. Optical mathematics are avoided except where necessary, but sufficient detail is given to encourage intelligent use of the microscope. The book is lavishly illustrated with plates and diagrams. The apparatus described is confined to that found on the American market which includes some well known Continental makes. The author notes with regret that English manufacturers in particular make no attempt to compete in this market, "for some of their designs are very appealing to discriminating microscopists". This blunt statement by an American will strike many British microscopists as somewhat odd in view of the widespread belief that certain foreign makes are superior to any produced in this country. In this connexion the author states that optical equipment such as objectives produced by reputable manufacturers is of a uniformly high standard and that no test that the ordinary microscopist can perform will detect any difference.

The book can be recommended to all who use a microscope, not only for details of ordinary technique but also for information on special apparatus and methods for tackling special problems. There is a mass of useful information, notably in the chapters on "Illumination" and "Getting the Most out of the Microscope".—G. SLAVIN.

FISHER, R. A. [Sc.D., F.R.S., D.Sc. (Ames, Harvard), LL.D. (Calcutta), Galton Professor, University of London]. (1941). **Statistical Methods for Research Workers.** pp. xv+344. London & Edinburgh: Oliver & Boyd. [8vo] [16s.]

The appearance of the eighth edition within 16 years of this well known book, now the classic work on statistics, is in itself evidence of the high esteem in which it is held by research workers, particularly those engaged on biological problems. Statistical examination of biological data has become an almost universal practice, but more important still is the fact that workers are now planning their experiments on a statistical design. It is becoming almost axiomatic that, provided the design is correct, the results will take care of themselves. No longer are statistics the prerogative of abstruse mathematicians; once statistical propositions are laid down their intelligent application can be left to biological workers whose actual mathematical skill need not be very great. It is impossible to state to what extent this book has been responsible for the change of outlook amongst biologists within the last few years, but its influence has assuredly been very high, and this is evidenced by the increasing number of original papers in which the work is quoted. It would be presumptuous to attempt any higher praise.

The present edition is practically a reprint of the last, except that as a war-time economy the number of pages has been reduced by the simple expedient of printing three or four lines more per page, a feature which in no way detracts from the readability of the book. The deviations from the previous text are slight and the alterations in the bibliography are the inclusion of one or two general papers relevant to the text published since 1938 and the extension of the author's own published work to include papers up to 1941 (although the date on page 330 is erroneously given as 1938).

The printing, quality of paper, and binding are of the publishers' pre-war standard.

—ALFRED EDEN.

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